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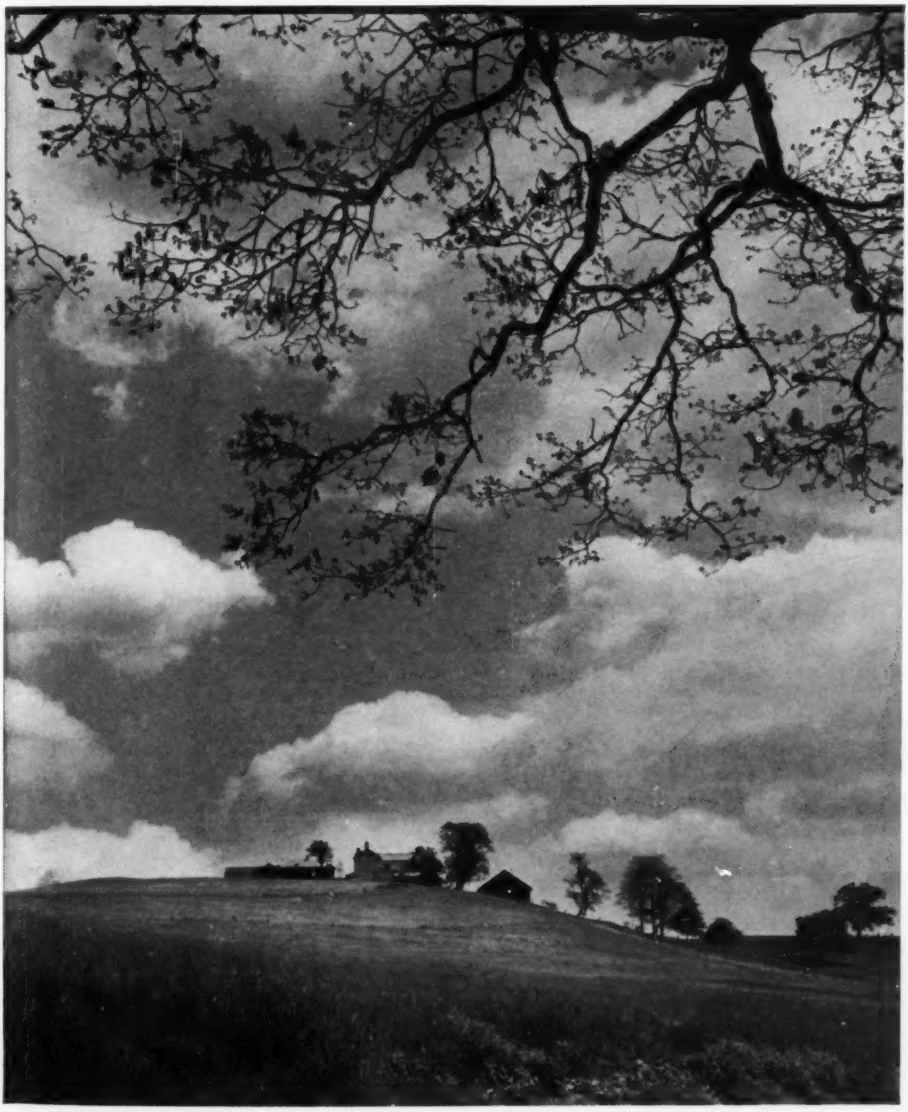

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Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXXIII NO. 3

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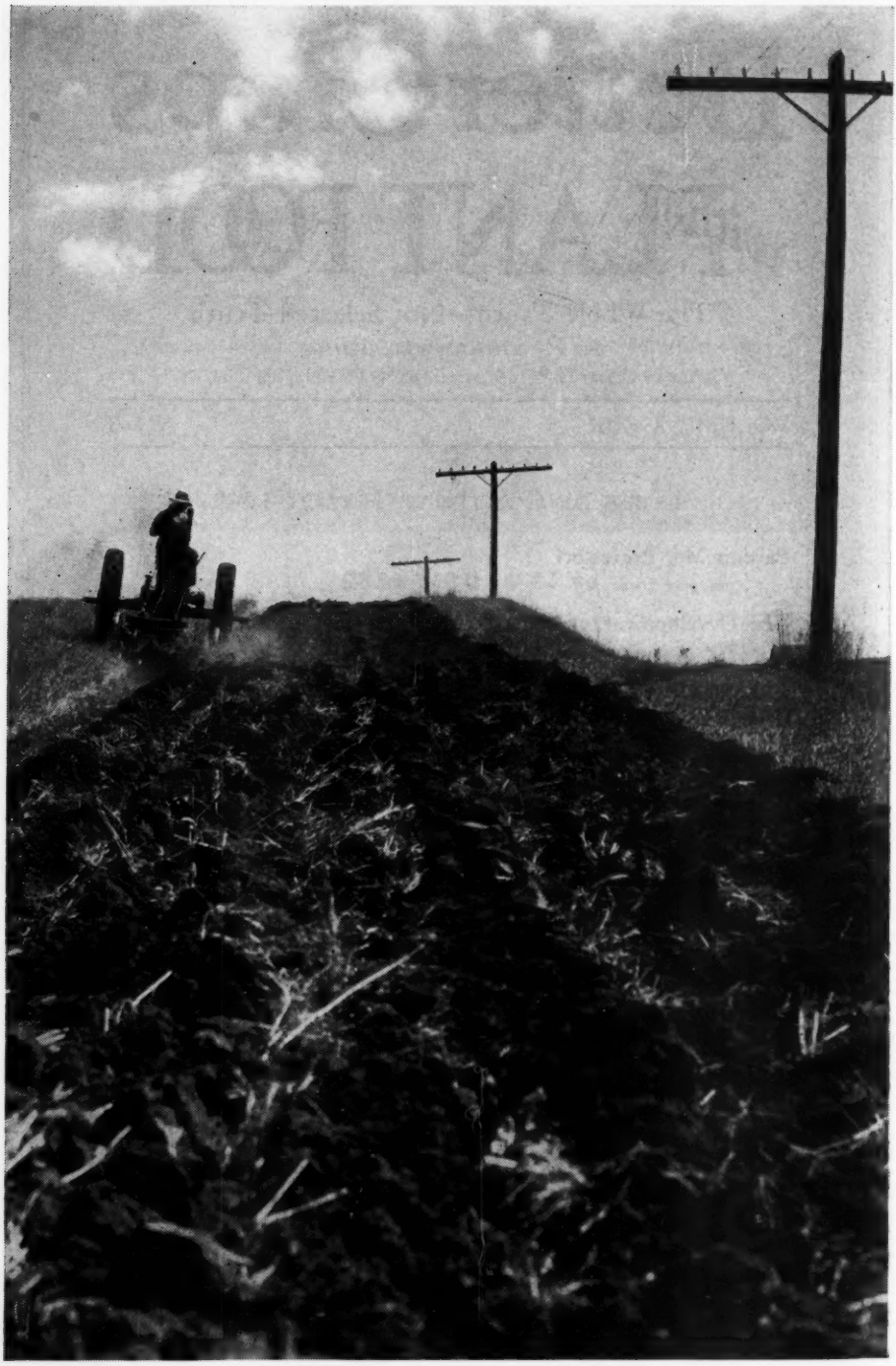

An Early Spring Landscape

Better Crops with PLANT FOOD

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VOL. XXXIII WASHINGTON, D. C., MARCH 1949 No. 3

For panoramic parodies . . . .

Pardon Me, Professor!

Jeff McDermid

IN case you prefer strict dictionary terms, a "professor" is one who professes and teaches any branch of science or learning, with special reference to established schools, colleges, and seminaries. Yet out our way in "them good old days" the important persons who bore the prefix of "prof" were teachers of many, many things—far more than was ever dreamt of in your philosophy, Horatio. Some of these individuals possessed greater right to the title than others, but few of us questioned the formula of local usage.

Whereas modern educational lingo dubs a gent a "doctor" after he has penetrated beyond the outer rim of learning, no such title belonged to the tutors of my youth. In those days doctors took care of human and livestock ailments, and only incidentally engaged in educational effort. So if you have any erudite friends with doctors' degrees, let's leave them out of this present discussion.

I detect a reluctance and withdrawal on the part of many noble high-brows to tack "professor" onto their cognomens. I have an inkling of the cause of this disavowal. Some even refuse to put a string to their kite by adding such fairly acquired degree letters as M.A., B.S., and Ph.D., almost as vehemently as though the letters were S.O.B.

My earliest awareness of a professor dates back to long gone days in the old town. Each day, to and from his job as principal of the high school, there walked a dignified, red-haired, frock-coated, middle-aged man—a man who never seemed to age perceptibly,

contrary to the experience of teachers in general. He was red-faced and bald on the days when I halted my marble game to watch him pass; and the flushed cheeks and shiny pate still persisted during the terms I sat bewildered in assembly hall hearing him discourse on physics and geometry.

YES, Professor Hough was a town institution just as much as the steel water reservoir on Prospect Hill or the volunteer fire department that used it. We common folks without much background in bookish lore or academic roots marked the presence of Professor Hough with due reverence and respect. Nobody ever thought of addressing him as "Mister" Hough. He was always spoken to and spoken of as Professor Hough, even by those who really knew young Bill when he was struggling through the university in the next county and supporting his widowed mother by doing odd jobs and summer farm work.

This natural admiration that the simple ones in our town held for this gentle fellow who grew old so easily was not as much reflected by the go-getters among our solid business and banking group. I doubt if they regarded Professor Hough as anything more than a guy who borrowed on a personal note, with his civic job and a friendly cosigner as security. He was not keeping step with the rising tide of ambition and progress, and he could not compare as a founder of prosperity with several young lawyers and insurance agents who quit formal learning with high school diplomas.

Financial standing did not affect our own outlook toward prominent citizens. Although we observed that Mrs. Hough worked daily in the city clerk's office and the older daughter had employment as librarian, this did not cloud our esteem for the Professor and his scholastic sway. I am glad for that evidence of our poise and good judgment.

Perhaps if I saw him in action now, or my youngsters had seen him from a newer viewpoint, Professor Hough might be called somewhat fuddy-duddy. He always smelled of peppermint lozenges, moth balls, and fresh shoe polish. His sense of humor was not remarkable and his imagination was not keen and soaring. But we did not doubt his innate honesty and upright character, nor his desire to inculcate us callow scholars with feeble sparks that might blow into a blaze of achievement—if the wind from the river was right.

His record shows that he opposed starting a school periodical, and was against a domestic science class and a manual training course in that era when both were luxuries. But he cooperated fervently with the women's book clubs and the old soldiers' post whenever a program was staged for juvenile benefit. I daresay he was a man who would run a good average with boss teachers today.

MY folks never had much to do socially with Professor Hough and there was little contact between them except the casual bowing salutations on the street. This is why, upon my return to the old town ten years after school days ended to attend the funeral of my mother, that I felt doubly surprised and touched when Professor Hough silently took a seat among a small circle of our oldest friends. It was the last time I ever saw him. But his presence there indicated some kindred feeling among that passing generation, of which we younger ones were largely unaware.

He lived a humdrum life of dull routine and was never known to raise a voice over the current issues of free silver vs. the gold standard, women's suffrage, or foreign immigration—pet subjects for evening debates by the high school's forensic amateurs. He was hired to be circumspect, conservative, and neutral, and to make facts, not opinions, his constant rule.

But wherever you are, professor, you

really left something for us to remember you by that wasn't set down there formally in the old contract with the board of education and the common council. You are therefore no longer bound by precedent and prejudice, and your shadow casts a better picture than you hoped it might.

Quite a different personality wore the prefix of dignity when Professor

Bernadino stepped off the train from California and set up a "polka palace" in the old armory hall. Most of us had inherited such lore of Terpsichorean kind confined to the all-hands-round and do-si-do of the pioneer square dance and rollicking reel. The waltz and the two-step came to our town with a vengeance that winter, thanks to the graceful, debonair, and polished finesse of this hot-blooded scion of some Spanish grandee. He was the beau ideal who taught us gangling kids to hold a handkerchief in our moist right hands as we clasped the silken bodices of our fair and fluttering partners and to make the courtly bow from the waist upon presenting ourselves for the dance. With his wife treadling on the plumping player piano, we counted out our "one, two, three" and clumsily fought our way across the waxed floor until the last measures of Hiawatha were stilled by the town clock's curfew strokes of ten.

I still argue that this adventure we had with the gorgeous outer world of spit-and-polish probably did us some lasting good. I know that I got to know a lot of nice girls at an age when my bashful shyness could have got me into what they now call a "fixation" of some mysterious sort. Whether any of those fair ones, now sedate and motherly, recall the fancy footwork in any similar romantic way is not for me ever to know. I haven't seen any of them for almost twenty years.

Next I recall Professor Pedley, a gray, soft-spoken, kindly man of the old gentility. His right to the title rested on skill at the parlor organ and deftness with the tuning fork. By the time I grew up, however, the community singing school had gone into total eclipse. So instead of holding customary classes, Professor Pedley took charge of a church choir and spent his week days tuning pianos for the favored few who owned them, sometimes annexing a stray pupil on his rounds. He had three lively, charming girls—all very much my seniors, but with whom I was very much in love. Dad did not recognize the true symptoms when he invested five dollars to pay for my ten music lessons in the Pedleys' Victorian parlor.

LINKED in luteful memory with the shade of Pedley is the more glamorous and flambouyant picture I retain of Professor Maurice Morrison—bumptious leader of our own local silver cornet concert band. On certain balmy, cricket-haunted summer nights; on grave and decorous Decoration Days; on brassy, humid July celebrations; and in between when time and funds permitted, the melody and beating rhythm of those enterprising entertainers gave us all something to be proud about. Although I never trumpeted or thumped under Morrison's tutelage, I sat on curbstones and fought mosquitoes and felt grandly lifted and enchanted while the Professor waved his baton over the tooters of the town. Bands are far more plentiful today, so that perhaps even my small talent

(*Turn to page* 48)

The Development of the

American Potash Industry

By J. W. Turrentine

Washington, D. C.

IN tracing the development of the American potash industry, the logical place to start would seem to be the beginning even though the story has often been told; and the beginning may be described as that point in our agricultural history when we first realized our state of utter dependence on a single foreign source for our supplies of potash salts which we had been taught to use and which we had learned were essential in scientific crop nutrition.

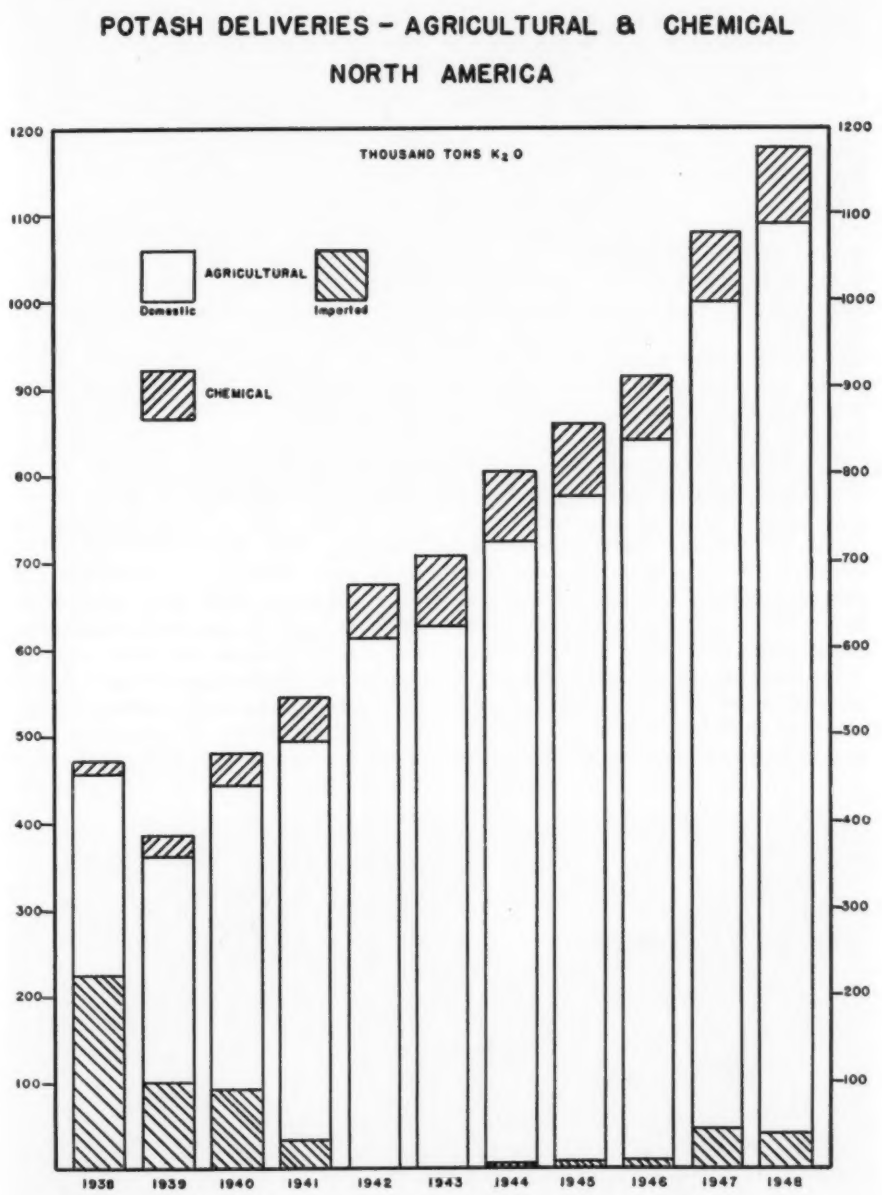
The date was 1910 and the single source of commercial potash salts was Germany. There the potash industry had been over-expanded to the point where surplus production and competitive selling were reducing to near bankruptcy many of the factors except the lowest cost producers, with resulting chaos. To save the industry the German government organized a trust, closed down the less profitable mines, assigned production to the more profitable mines and fixed the prices at which potash salts could be sold.

This resulted in the cancellation of favorable contracts with the American buyers, who brought their troubles to Washington after the good, old, traditional manner and were told that the proper solution of the problem was the severance of dependence on Germany through the establishment of domestic sources of potash—if such could be found and developed. Subsequently a Congressional appropriation became available in 1911 for exploration in the United States for occurrences of minerals, salines, brines, and seaweeds from which potash could be produced.

Those explorations and surveys were most opportune, for in 1914, with the outbreak of World War I, German importations were abruptly terminated and we were left deprived of all potash supplies. Thereupon, under the impetus of a price increase from $35 to $500 per ton of 50% muriate, practically all of the potash-bearing raw materials (and industrial wastes) listed as the result of Federal surveys were placed under industrial development, resulting in the construction of 128 production units, with an output of 209,000 tons of salts containing 54,800 tons K_2O by 1918, and a rated but unrealized capacity considerably in excess of that.

The critical nature of the emergency did not admit of technological research. On the contrary, potash was being extracted in many instances "by main force and awkwardness." As a result, with the reappearance of German potash on the American market at a carefully regulated descending scale of prices, the wartime domestic industry faded away with only three units surviving to recent years.

But potash research continued and one of the enterprises that survived the post-war deflation in potash interest developed its processes to the competitive basis and became a major factor in potash production—the American Potash and Chemical Corporation, the American Trona Corporation of World War I. Since that time, beginning with the extraction of potassium chloride from the complex brines of Searles Lake, California, through dint of continuous and persistent research it has undergone de-



velopment after development, added product after product from the raw material processed, to reach its present state of constituting one of the outstanding chemical achievements of this country. Here is to be found phase-rule chemistry in its most intricate form applied on the plantwide scale and mechanized with the greatest precision.

It was in this plant that occurred the first large-scale application of the vacuum-cooling crystallization of potassium chloride yielding a product of 97% purity which established the now well-known "60% muriate" as the standard potash grade.

Prior to 1926, surveys for the search for potash resources had been restricted to what might be called surface aspects of the problem, outcroppings of potash minerals, the less pure strata of sodium chloride in salt mines already opened, and subterranean brines from salt springs and oil wells. No funds had been provided for the exploration otherwise of the Nation's great saline deposits with which it was well known from German explorations that potash deposits were associated. Conspicuous and least explored among these salt deposits was that of the vast Permian Basin underlying parts of Texas, New Mexico, and the states to the north.

It was in this area of Texas that in the examination of the natural brines from oil-well drillings potash salts were found in solution. Then followed the discovery of fragments of crystalline potash minerals, indicating the occurrence of potash segregations in the saline strata penetrated by the borings.

On the basis of such evidence, meager at best, a bill was introduced in the Congress in 1924, "Authorizing Investigation by the United States Geological Survey to Determine Location and Extent of Potash Deposits in the United States," which by dint of much perseverance on the part of its proponents and after drastic amendments including the designation of the U. S. Bureau of Mines as a participating agency, became law in 1926.

Under this authorization between 1926 and 1931, 24 core tests were drilled, 10 in Texas, 13 in New Mexico, and 1 in Utah. Beds of potash salts described as "of possible commercial interest" were encountered at depths of from 373 to 2,737 feet, varying in thickness from 1 ft. 6 in. to 8 ft. 10 in. and in potash content of from 9.12 to 13.94 per cent K_2O.

The drilling procedure made use of the plunger type of drill through the overlying rock strata until the saline strata were encountered, whereupon the diamond core drill was substituted. With the use of saturated saline solutions as lubricants, complete cores of the saline strata were recovered and their content of potash minerals identified and analyzed. This activity and the related publicity which preceded it

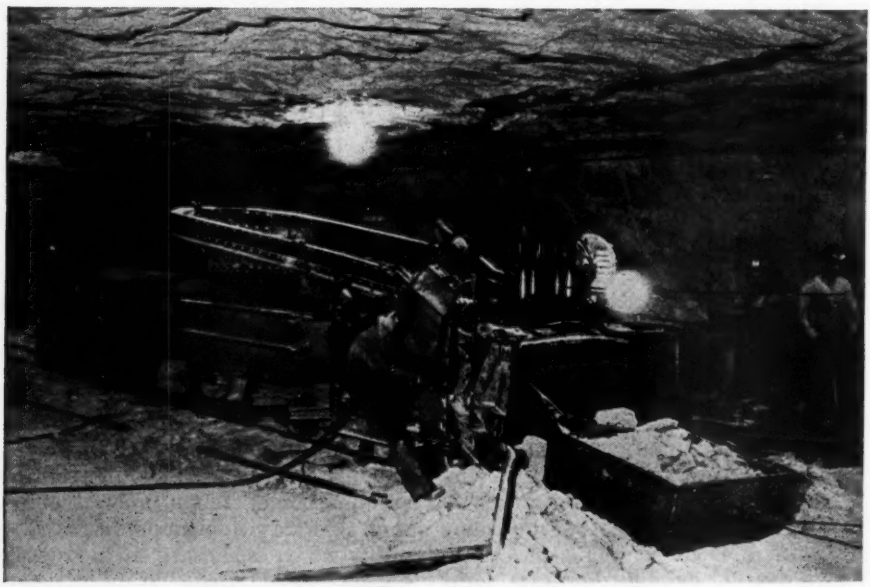


Fig. 1. Subsurface view of Mines of the U. S. Potash Company, Carlsbad, New Mexico.

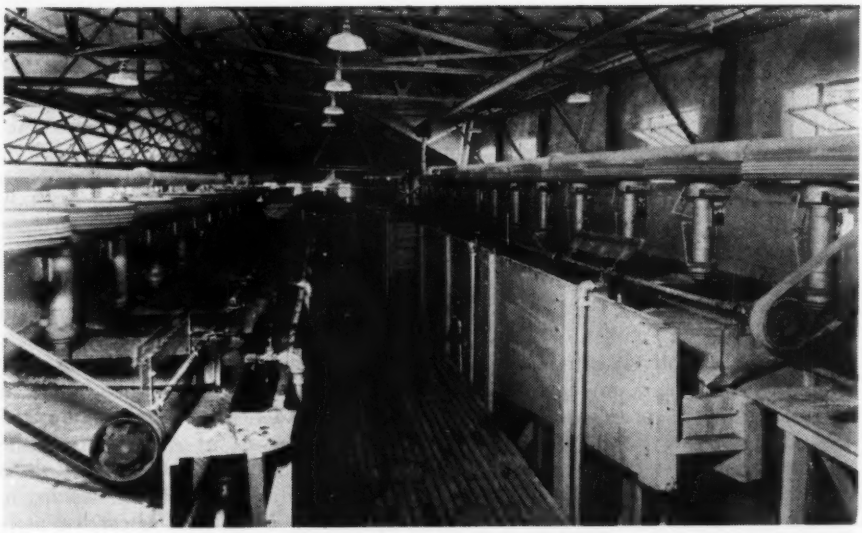


Fig. 2. Concentrating raw potash by flotation process in Potash Company of America plant, Carlsbad, New Mexico.

alerted the oil-drillers exploring for oil in the Permian Basin to the possibility of discovering potash deposits and taught the technique of identifying such deposits if encountered.

Accordingly and concurrently the Snowden and McSweeney Oil Company exploring for oil in the neighborhood of Carlsbad in Eddy County of southeast New Mexico discovered a potash deposit as the result of the first core test for potash beginning April 14, 1926. This deposit proved of such richness and thickness and at a depth of only 1,000 feet as to leave no doubt as to its entire commercial value—a deposit which with further exploration to determine its lateral dimensions was recognized as equal to the best of the European deposits. Among the several strata of water-soluble potash minerals penetrated was the bed of sylvinite (a natural mixture of sylvite, potassium chloride, and halite, sodium chloride) containing 21% K_2O, which was destined to become the major source of potash for American agriculture.

In the development of a potash industry based on this deposit, the United States Potash Company organized by the aforementioned oil company was the first to enter this field and with production beginning in 1931 became the American pioneer in the mining and refining of a raw material from such a source. Its mine was equipped with the latest mechanical devices and its refinery in accordance with the best technology then developed. Thus was realized for the first time the dream of an American potash industry similar to that of Europe, long recognized as the ideal.

Then followed in the same field the Potash Company of America (organized in 1936) with a mine thoroughly mechanized and a refinery built to apply the flotation process, the first industrial application of the familiar flotation principles to a water-soluble ore. This was followed in turn by the mine and refinery of the former Union Potash and Chemical Corporation, subsequently to be amalgamated with the International Minerals and Chemical Corporation, again with a mechanized mine and a refinery employing flotation methods in part at least. Including the aforementioned American Potash and Chemical Corporation, these four companies are the major factors of the American potash industry.

Intermediate in scale of production is the plant of Bonneville, Ltd., near Wendover, Utah, where the raw material is a brine found in the clay stratum underlying the salt crust covering the Bonneville Flats or Salduro Marsh of the Salt Lake Basin. Here solar evaporation is employed to yield a mixture of crystalline potassium and sodium chlorides, subsequently separated by flotation.*

In more recent years, the Dow Chemical Company of Midland, Michigan, has become a relatively minor producer of high-grade potassium chloride as a by-product of its processes employing the natural brines of that State as the raw material.

While steadily increasing their capacities, the major producers have added other chemicals to their list of products and thus have effected a diversification and full utilization of the constituents of their raw materials. Outstanding in this respect is the American Potash and Chemical Corporation with a list of products that includes potassium chloride of some 98% purity designed for the fertilizer trade and a product further refined for the chemical trade, as well as potassium sulfate, sodium sulfate, sodium carbonate, sodium borate decahydrate, sodium metaborate, boric acid, bromine, potassium, sodium, and ammonium bromides, and lithium salts.

The potash ores of the Carlsbad area are too free from impurities to admit of such an array of products; yet under production are potassium chloride of several degrees of purity and crystal size, 60% muriate, 50% muriate, and 22% run-of-mine salts, potassium sulfate, sulfate of potash-magnesia, and potassium chlorate.

In tracing the development of the American potash industry, mention of an occurrence of 1935 may be warranted. The industry by then had reached those production levels where it felt itself justified in participating in the scientific research and educational activities long supported by the potash importers with enviable success. Accordingly, in that year the American Potash Institute was organized with an experienced staff designed to conduct the agronomic, editorial, chemical, and economic purposes and activities in the agricultural field for which it was organized,—namely, consumer service in the scientific and therefore profitable use of potash in crop production. To this end, supported by the American Potash and Chemical Corporation, the Potash Company of America, and the United States Potash Company, there are maintained research fellowships in the leading agricultural research centers of the Continent, and headed by the Agronomic Journal, "Better Crops With Plant Food," there is disseminated a large volume and diversity of educational literature dealing with the many aspects of the profitable use of potash in agriculture.

With these developments, the advent of World War II in 1939 found the Nation in a radically different situation with respect to potash supplies as compared to that former situation of critical and near-disastrous dearth of supplies in 1914. On the later occasion the interested public greeted with considerable skepticism the announcement that the American potash industry was then prepared to take care of the Nation's potash requirements, for it was known that up to September of that year we still had been importing a considerable percentage of our potash requirements. What was not so generally known was that we had been exporting a substantial proportion of our production, which could and would be diverted back immediately into the domestic market; that we had large expansions in production capacity underway; that we had great reserves of unrefined run-of-mine salts readily available to equal any deficit in the refined salts that might develop; and that production of potassium

* The operations of these five potash production units including their processes are described in detail in the book, "Potash In North America" (Reinhold Publishing Company, 330 West 42nd Street, New York 18, N. Y.).

sulfate, formerly largely imported, could and would be promptly expanded.

As recently as 1938 we still imported 65,000 long tons of potassium sulfate from Europe. At that time we already had some production from the interaction of potassium chloride and sulfuric acid. This conversion was promoted by the Potash Company of America in collaboration with producers of salt cake, potassium chloride being substituted for sodium chloride in that process. Later the American Potash and Chemical Corporation entered upon this production through the interaction of potassium chloride and burkeite, another practical application of the phase rule. In 1939 this company announced its willingness to expand initial production to provide the essential requirements of agriculture, and proceeded to do so. This was followed in short order by the completion of the refinery of the International Minerals and Chemical Corporation with the production of potassium sulfate from langbeinite (a natural potassium-magnesium sulfate) by interaction with potassium chloride. As the result of these activities, keen apprehension as to the adequacy of wartime supplies of this form of potash so essential in the growing of quality tobacco promptly subsided.

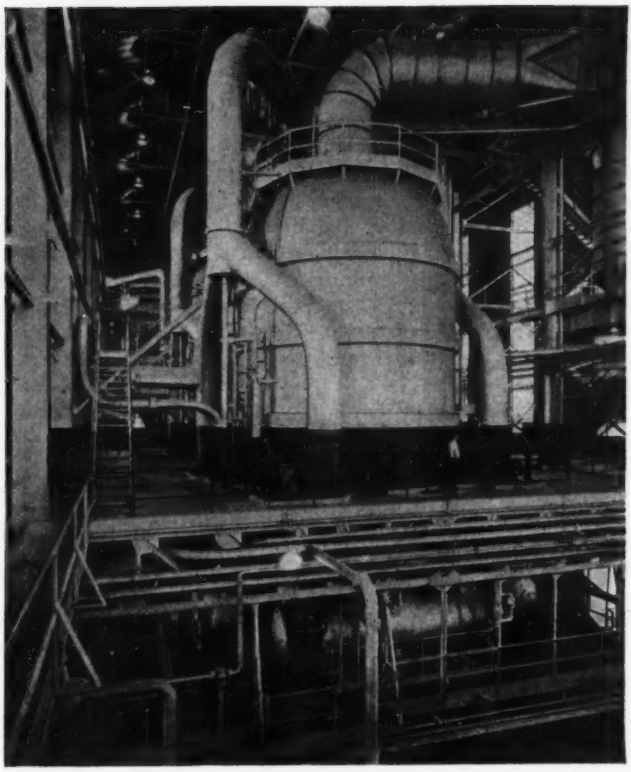


Fig. 3. Evaporator unit in the plant of the American Potash and Chemical Corporation's plant on Searles Lake, California.

Likewise, the interruption of European exports deprived us of our accustomed source of agricultural water-soluble "magnesia" and magnesium sulfate and sulfate of potash-magnesia, both of German origin. This situation was adjusted by the last-named company in production of "washed langbeinite," an acceptable substitute for the formerly popular sulfate of potash-magnesia.

As the war progressed, drew to a victorious close, and the Nation entered upon its reconstruction period of ever-increasing demand for agricultural products, calling for more and more potash wherewith to grow them, there was no let-up in the potash industry's efforts to meet the requirements. Thus from an output of 535,000 tons of potash salts, equivalent to 317,000 tons K_2O in 1938, the last normal prewar year, production has increased each succeeding year, reaching a volume allow-

ing a total of deliveries in 1948 of 2,132,512 tons of salts, equivalent to 1,133,773 tons K_2O. (See Chart.) This potash was produced on an ever-expanding scale under the many wartime handicaps that confronted the production industries in general but without the special Federal dispensations of capital and other aids so liberally provided other industries whose products were regarded as more intimately tied in with the war effort. The chart, therefore, presents a picture of performance and of voluntary response to a national demand.

Superimposed was the task, voluntarily assumed by the producers, of supplying Canada with its requirements on terms of exact equality with our own. Added thereto were the requirements of Puerto Rico and Hawaii, of course, Cuba and the "good neighbors" to the south of us. Even "lend-lease" came to us for its quota.

Then the chemical industries, in 1938 consuming some 14,903 tons K_2O in their numerous manufactures, under the impetus of wartime demands had increased their estimated requirements to 100,000 tons K_2O by the war's end, dropping back to a peace-time requirement of 88,026 tons K_2O in 1948.

This record of performance was achieved without a price increase for the major grade, 60% muriate, making up some 90% of the total. In fact, during the period covered in this outline of the development of the American potash industry, prices have decreased. Prior to 1947 potash prices were quoted C.I.F. Atlantic and Gulf ports. Since that date, they have been quoted F.O.B. point of origin. Applied is a maximum seasonal discount of 12% from the list price under which some 90% of total sales are made. On the old C.I.F. basis, the per-unit price of 1910-14 was 71.4 cents for muriate. By 1946 this price had been reduced to 47.1 cents (with the 12% discount applied), a reduction of 24.3 cents per unit. The 1914 price of $35 per ton for 50% muriate is comparable to the 1946 price of $28.26 per ton for 60% muriate. The increase in concentration from 50% to 60% represents a corresponding decrease in transportation charges per unit K_2O. The current F.O.B. price under the 12% discount is 33 cents per unit for the 60% grade of muriate. As compared to the former C.I.F. price this is a further reduction at many points of delivery.

Thus, on the basis of the production and price records, it would appear that the claim that the American potash industry has shown its entire competence to meet all of the Nation's more essen-

TABLE I. NORTH AMERICAN DELIVERIES OF DOMESTIC POTASH SALTS FOR THE CALENDAR YEARS, 1947 AND 1948

(United States, Canada, Cuba, Puerto Rico, and Hawaii)

Salts	Short Tons K_2O 1947 Tons K_2O		1948 Tons K_2O	
Muriate	831,400		885,885	
Manure Salts	46,235		68,439	
Sulfate and sulfate potash-magnesia	72,955		77,791	
Total Agricultural		950,590		1,032,115
Chemical	82,707		88,026	
Other Exports	11,920		13,631	
		94,627		101,657
Grand Total		1,045,217		1,133,773

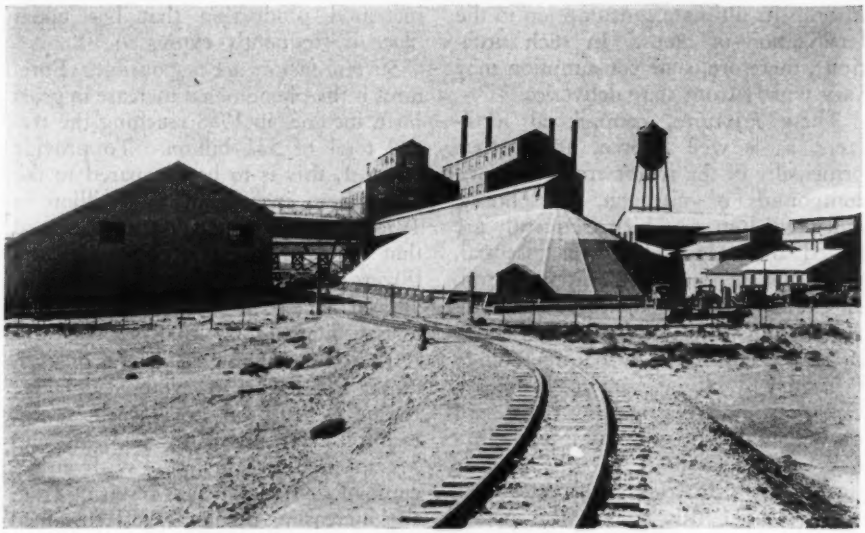


Fig. 4. Storage facilities and refinery of U. S. Potash Company, Carlsbad, New Mexico.

tial needs for potash salts for the agricultural and chemical industries, during not only the critical period of World War II but also subsequent years, is justified.

The Continental distribution of the 1948 output of potash salts is shown in the tabulation of Table I together with that of 1947 introduced for the sake of comparison.

For total supplies available, there should be added to the foregoing 45,000 tons K_2O imported in North America in 1947 and 40,000 tons in 1948. The item "Other Exports" relates to shipments to countries other than those mentioned in the title of the above tabulation.

With further reference to potash importations from Europe, it was expected that they would reappear with the progress of reconstruction in the European areas of production. Imports have reappeared in limited tonnages but at prices so far above the domestic prices as to provide little evidence as to whether the low volume is due to such price differential or the absence here of any great unfulfilled demand. Further, since potash prices in the United States are the lowest of all world markets, it is apparent that only unsold surpluses abroad, which do not exist, or the quest of dollar credits here would be a sufficient incentive for exports to this country in any great volume.

As to the distribution of the American output within the Continental United States, during 1948 potash salts were distributed by the primary producers to 45 states and the District of Columbia, which may be taken as the prevailing pattern. In that year, Georgia and Ohio practically tied for first place with deliveries of some 88,550 tons K_2O, followed in order by Illinois, Virginia, North Carolina, and Florida. State deliveries, however, cannot be taken as synonymous with state consumption, for the following reasons: Currently, potash salts are sold wholesale and in carlots to the fertilizer mixing industry which functions as the retail agency distributing the potash to the ultimate consumer, the farmer, principally as a constituent of mixed goods, some 95% of the total being so distributed. From the larger mixing plants, the products frequently are shipped across state borders into neighboring and sometimes quite distant states where the potash contained there-

in finds its ultimate consumption in the fertilization of crops. In such situations, therefore, state consumption may vary widely from state deliveries.

These mixtures, commercial fertilizers, as is well known, are carriers principally of the major crop nutrients, compounds of nitrogen, phosphorus, and potassium, to which frequently are added the minor, but still essential, nutrients such as magnesium, boron, and others. These mixtures are compounded in various ratios as determined by such factors as crop requirements as indicated by official state recommendations, the nutritive status of the soils on which grown (as determined by soil tests), the availability of supplies, and in too many situations habit and tradition. Under this system the potash content may vary from 0 to 27% K_2O.

Yet, despite the record of production and distribution, as herein related, there are potash demands that remain unfilled, articulate from those who want more and silence from those who have enough, providing no basis whatever for gauging the dimensions of the deficit in supply. Surprise that the market has increased as it has in view of the increased production that has taken place is frequently expressed.

Several factors are responsible. Foremost is the phenomenal increase in gross farm income, in 1948 reaching the record total of $31 billion. To provide contrast, this is to be compared to the gross farm income of $9.4 billion in 1938. It is a matter of statistical record that the farmer's expenditures for fertilizers rise and fall with his income and in a close ratio thereto, which is to say that he habitually spends for fertilizers so many cents out of each dollar of income, varying widely between agricultural areas such as for example, 16 cents in the Southeast and 3 cents in the Midwest. With an income of such dimensions resulting from the increasing demands and sustained high prices for farm products since the beginning of World War II, the farmer has had funds wherewith to purchase plant-food material more nearly in the quantities and of the grades he has been taught to use by his agronomic advisers.

In recognition of this economic rule other segments of the fertilizer industry, notably the phosphate producers, have greatly expanded their output and have applied an increased percentage of that output to the preparation of mixed goods for which, of course, potash is needed.

Thus education has become a further important factor accounting for this phenomenal increase in potash consumption—education based on research and field demonstration imparted to the farmer by many zealous Federal and state agricultural agencies.

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Fig. 5. Heavy equipment for removing potash salts from large stock piles in storage, American Potash and Chemical Corporation's plant on Searles Lake, California.

Fig. 1. There are too many such cornfields in the South.

Better Louisiana Corn

By R. A. Wasson

Extension Agronomist, Louisiana State University, Baton Rouge, Louisiana

THE corn acreage in Louisiana is holding steady at about one million acres. In 1945, and for a considerable period prior to that time, the State average production was about 15 bushels per acre. The average yield has been increased since 1945 and is now around 20 bushels per acre. This increase has been largely due to a greater planting of adapted hybrids, higher rates of fertilization, and improved cultural practices.

Since 1945 a summary of the records on 1,487 demonstrations conducted by county agents comparing adapted hybrids with leading open-pollinated varieties reveals that the hybrids have averaged 41.2 bushels per acre as against 29.4 bushels for the open-pollinated corns. Also since 1945, a summary of the records on 504 corn fertilizer demonstrations reveals that an average yield of 45 bushels per acre has been made where the corn was fertilized according to recommendations as against 28 bushels per acre where the corn was fertilized according to methods commonly used on the farms. We are convinced that cultural practices can and do have equally as much influence on yields as either variety or fertilization.

We believe that the production of a good corn crop depends, to a very large extent, on five factors. These factors, listed as to the time element rather than their relative importance, are: (1) Fertility, (2) seedbed preparation, (3)

Fig. 2. Corn like this shows the results of proper methods.

good seed, (4) thorough cultivation, and (5) weather. All of these are largely controlled by the farmer except the weather; and, if the other four factors are well cared for, the weather will be very much less important than is usually thought.

Good Land and Fertility

Corn, due to its extensive though comparatively shallow root system, requires a good, deep, well-drained, and mellow soil to produce heavy yields of grain. Thin, eroded, and poorly drained land will not produce profitable yields. Corn is a crop that requires an ample supply of plant food for good yields and if this food is not already in the soil, it must be supplied by the grower. In most of Louisiana this means the application of nitrogen, phosphorus, and potash. On river bottom soils (delta or alluvial), nitrogen alone is usually sufficient.

On heavier and more fertile alluvial soils, sidedress with 48 to 96 pounds of nitrogen per acre. For corn on lighter, alluvial soils such as very fine sandy loams, use 300 to 400 pounds per acre of an 8-8-8, 6-8-8, or 4-8-8 before planting and sidedress with 32 to 48 pounds of nitrogen.

On the soils of the Coastal Plain, Coastal Prairies, and Mississippi Terraces use 300 to 400 pounds per acre of an 8-8-8, 6-8-8 or 4-8-8 and sidedress with 32 to 48 pounds of nitrogen.

Where recommended mixed fertilizers plus a sidedressing with nitrogen have been used, the average of most research over the past 3 years has given a return of approximately 1 bushel increase for each 2.5 pounds of nitrogen used, or approximately 20 bushels increase over the checks receiving no fertilizer. The total nitrogen in most cases varied from 45 to 60 pounds per acre. The mixtures used supplied from 24 to 30 pounds of phosphoric acid (P_2O_5) per acre and the same amount of potassium oxide (K_2O). For best average results the application should be 30 pounds each of phosphoric acid and potash (K_2O) and a total of 60 pounds nitrogen per acre with about 15 to 20 pounds of the nitrogen (N) applied before planting.

On fertile alluvial soils where nitrogen only was used, the increased yield has averaged about 1 bushel for each 2 pounds of plant-food nitrogen (N) applied. Under ideal conditions the increase has reached 1½ bushels for each 2 pounds of nitrogen used.

Recent experiments and farmer demonstrations have shown that on fertile alluvial soils, with an ample supply of organic matter, the applications of nitrogen can be profitably increased up to 100 pounds (N) per acre. Where 48 or more pounds of nitrogen are used, it is a good practice to put at least one-third of the nitrogen under the corn and use the remainder as a sidedressing when the corn is about 10 to 12 inches tall.

Plant-food Deficiency Symptoms in Corn

Nitrogen—When the plants are nitrogen-starved the leaves will first turn yellow in the center along the midrib. Following this the leaves shrivel and fire.

Phosphorus—Where there is a phosphorus deficiency the young plants often have a purplish cast and the tips of the leaves may die.

Potash—If the plants are starved for potash the leaves will first turn brown along the edges or margins. The edges will appear to be scorched.

Moisture—When there is ample plant food present in the soil and the plants are starving for moisture, the leaves will roll or twist without losing their green color. If moisture conditions improve in time, the leaves will unfold and resume normal functions.

Excess Phosphorus—Where there is an excess of phosphorus as related to the available supply of nitrogen and potash, particularly on hybrid varieties, the tendency for "suckering" is greatly increased.

Spacing

The number of plants per acre and the amount of fertilizer to use should be decided together. If there is not enough plant food for the stand of corn, both yield and quality will suffer. If the stand is too thin to use up the plant food available, this too will be a source of loss. The proper combinations of nitrogen and spacing are shown in Table I. In setting up this table it was assumed: (1) That the land is fertile enough to make 20 bushels of corn per acre without additional fertilizer; (2) that each stalk would produce .6 of a pound of ear corn; and (3) that each extra bushel of corn would require 2 pounds of plant-food nitrogen. These assumptions are in line with experimental results.

Table I is based on an average of 1 stalk per hill for the spacings indicated. Where calcium cyanamid is used as a source of nitrogen, use the rates as shown for sulphate of ammonia since the amount of plant-food nitrogen is approximately the same in both materials.

Nitrate of soda, ammonium nitrate, and sulphate of ammonia can be applied either under the corn before planting or as a sidedressing. When sulphate of ammonia is used as a sidedressing, it must be covered with at least an inch of moist soil. If it is not covered with soil, much of the nitrogen will be lost

TABLE I

Spacing on 3½-ft rows (in inches)	Nitrogen Lbs. per acre	Nitrate of soda Lbs. per acre	Ammonium nitrate Lbs. per acre	Sulphate of Ammonia Lbs. per acre	Approximate plants per acre	Estimated yield (bushels per acre)
12	160	1,000	500	800	12,000	100
18	100	600	300	500	8,000	70
24	60	400	200	300	6,000	50
30	40	250	125	200	4,800	40
36	30	190	95	140	4,150	35

as ammonia gas. Cyanamid is always applied under the corn before planting, preferably 10 to 14 days.

Thick spacing of corn (8 to 16 inches between hills) should be restricted to corn planted before April 1. Use a somewhat wider spacing for corn planted during April (10 to 20 inches). Corn planted in May should be spaced 16 to 24 inches. On upland hill soils the safest spacing will range from 16 to 24 inches for early and medium early plantings and 24 to 30 inches for late April and May plantings. Remember that it takes from 14 to 20 tons of soil water to produce 1 bushel of mature corn. Late planted corn almost invariably meets with moisture difficulties and that is the reason why it is not safe to space it as thick as corn planted early. It is doubtful if corn growers on upland hill soils are ever justified in spacing closer than is shown in this table for a 40- to 50-bushel yield per acre.

Amount of Seed

One of the main reasons for low corn yields, in many cases, is that uniform stands are not obtained. It is usually considered that 1 gallon of corn will plant 1 acre (or 8 acres to the bushel), but the amount of seed will vary according to the size of kernels and the spacing. It is better to plant plenty of seed than to "skimp" on the seeding rate, since it is more economical to thin the stand than to replant or to leave a poor stand. Where budworms and birds usually damage young corn, it is even more important to get up a heavy stand. As a rule, the seed should be covered about 1¼ inches deep.

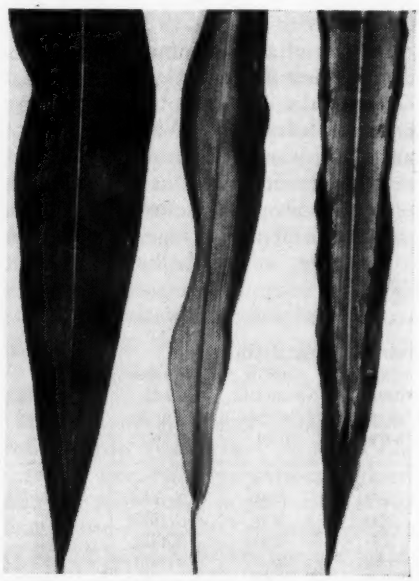

Fig. 3. Left, complete fertilizer; center, starved for nitrogen; right, starved for potash.

Seedbed Preparation

The second factor in good corn production, seedbed preparation, is very frequently under-valued in Louisiana. With corn, especially, this is a matter of the utmost importance. To be good the seedbed should be deep, well-pulverized, and very thoroughly cultivated before the planter goes into the field. An ample supply of organic matter worked into the soil and thoroughly mixed with it is also very important. This is one of the ways by which bad weather conditions, sure to come later in the season, may be overcome. To a much larger extent than most farmers realize, the yield of corn is determined at this time.

On hill soils, slightly higher yields have been obtained from plantings made in the "water furrow" than from plantings made on ridges and on the level.

On flat alluvial or other flat or nearly flat land, as a general rule, slightly higher yields have resulted from planting on low ridges.

Water Requirements

Corn planted on poor soil requires more water to produce a given amount of corn grain than does corn growing on fertile soil. In other words, a liberal supply of fertilizer makes corn plants more efficient in using available water. It is, of course, possible for water to be a limiting factor in producing corn on any soil. Often when corn begins to "fire," dry weather is blamed when

Fig. 4. Potash deficiency on corn following a bur clover seed patch.

actually the "firing" is a sign of nitrogen starvation. On the Delta Experiment Station in 1947 in the nitrogen test on corn, pronounced "firing" of the leaves took place on the lower half of the plants until the rate of nitrogen application reached 64 pounds (N) per acre. No firing occurred at nitrogen rates above 64 pounds (N) per acre. This corn was planted on May 6, and had only one light shower of rain from planting time to maturity.

Good Seed

Good seed is the third factor to be considered for best corn yields. In selecting a variety to plant it must be kept in mind that production between varieties varies as much as does the production of milk between cows. This factor of good-producing seed is of much more importance than is usually realized by Louisiana farmers.

It takes several years to develop a good hybrid. After this is done it then takes 3 years to produce the planting seed. All corn growers should buy new hybrid seed each year. Seed saved and replanted from a crop of hybrid corn is not likely to produce yields as high as the original hybrid seed.

Time of Planting

Date of planting tests at the Northeast Louisiana Delta Station have shown that, when seasons permit, corn should be planted as early as possible. March planting has given somewhat higher yields than plantings in late April and May. This early planting also, to a large extent, eliminates conflict between cultivation of corn and cotton, since the corn is laid by before the rush of cotton cultivation begins. Where high fertilization and hybrid seed are used, the corn should be spaced so as to give 6,000 to 12,000 plants per acre, depending upon the producing capacity of the soil.

Date of planting tests at the North Louisiana Hill Land Station at Calhoun have shown that the best period is from March 15 to April 5. The recommended average spacing on ordinary rows is 1 plant every 24 inches or 6,000 stalks per acre.

Cultivation

Cultivation is the fourth step in corn production and could be called the most important factor in profitable production. It is estimated that more corn is

Fig. 5. The corn at the left received no fertilizer; that at the right, 400 lbs. of 6-8-8 per acre.

lost each year in Louisiana from poor, or lack of, cultivation than from any other one cause. After the thorough seedbed preparation previously mentioned, cultivation should begin by the time the corn is 1 inch high. The first cultivation, due to the small size of the corn, will necessarily have to be shallow. This early cultivation is very important, however, as it destroys the first crop of weeds and grasses and also creates a mulch for promoting growth of the corn and for the conservation of moisture. Following this, the corn should be thoroughly cultivated each week, weather permitting. The second and third cultivations may, and probably should be, fairly deep. After the third weekly cultivation, however, the corn should receive weekly shallow cultivations until the plants reach a height of about 4 feet. If the work has been properly done up to this time, the crop is now ready to be laid by. It is not considered profitable, and may even be injurious, to cultivate up to the time the corn bunches to tassel. The lay-by plowing should leave the corn row almost level with the rest of the field. This will not cut off or expose many essential feed roots and it will greatly reduce the surface area of the soil exposed to evaporation of life-giving moisture. It cannot be emphasized too strongly that the fate of the crop depends upon the treatment it receives during the first three weeks of its life.

Weather

The fifth factor in producing a good corn yield is the weather. It is impossible to change the weather, but when the other four steps described have been well and fully carried out, it will be found that adverse weather conditions are not so important as they are sometimes claimed to be. Generally speaking, it never rains enough to make a good corn crop on thin or poor soil, but the weather is generally favorable on good soil, if other things are done well.

Up until the last few years corn has been more or less the "stepchild" of Louisiana agriculture, but recently it has moved into a position of recognized economic importance. A considerable portion of the grain is going into commercial grain markets at satisfactory profits to producers. A rather large volume of the production is now being

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Expand As You Learn Say Person Farmers

By T. H. Jeter

Agricultural Extension Service, North Carolina State College, Raleigh, North Carolina

PERSON County farmers have been doing a lot of pioneering in these last three or four years. Person is one of the old North Carolina tobacco counties, but many new enterprises are developing alongside those tobacco fields and barns. The sum total of these is bringing about a sizable increase in farm income.

Most of these farmers start in a small way and expand with experience and knowledge. There is the case of Umstead Laws who owns a place on the outskirts of Roxboro. Ten years ago, Mr. Laws began to fatten a few broilers for the local trade. The chicks were brooded in a small frame house to get the enterprise started in a modest way. Mr. Laws is now in the midst of erecting a two-story, concrete-block, broiler house so that he can brood and fatten between 9,000 and 10,000 chicks at a time. The house is so designed that the work may be done conveniently and with the least amount of labor necessary.

Alfalfa growing likewise started in Person in a small way with a few men planting an acre or two in trial patches. This winter, there are at least 150 farms on which alfalfa is growing. The folks who have it, tested their soils before planting, limed the land as needed, used borax with a good fertilizer to keep down yellows, planted seed that were well inoculated, and otherwise handled the crop according to the latest findings of science.

Even so, some of the alfalfa has not done so well. That was to be expected. R. E. Talley and W. R. Barker of the Senora section, as well as J. D. Winstead, Jr. of the Concord section, had some die this winter. They were mystified as to the cause. County Agent H. K. Sanders says that a part of the trouble with some old alfalfa on the Talley farm was due to frost. On the Barker farm, the trouble was due to an impervious clay subsoil, through which the taproots of the alfalfa plants could not pierce. On the Winstead farm it developed that there were two acres where the seed had not been thoroughly inoculated at planting. Mr. Winstead made plans to re-inoculate this alfalfa immediately, and he expected to have no more trouble after that had been done. Most of those who have the crop well established are making plans to topdress their fields this spring.

Person farmers are fast learning that they must use the proper amounts of fertilizer per acre if they are to get the best yields of all crops. All general crops, of course, require nitrogen, phosphate, and potash, along with, perhaps, some of the so-called minor elements, where the land has been long in cultivation. If any one of these is deficient in the soil, then the land will yield only up to that point where this deficiency permits.

F. L. Moore of Hurdle Mills is recognized as one of the best farmers in the county. In fact, he and his wife were nominated by their neighbors last summer to be the master farm family of the county. Twenty-two years ago, Mr. Moore began to realize that his old blackjack soils needed more potash in the fertilizer mixture. He says now

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These chicks can be depended on to develop into heavy egg producers. They are the result of selective breeding under the National Poultry Improvement Plan, sponsored by the Department of Agriculture.

Egg Crop Has Surprises

By C. B. Sherman

Bureau of Agricultural Economics, U. S. Department of Agriculture, Washington, D. C.

ALONG with the greater farm production from fewer farms and fewer farm workers that we hear so much about, we are having more eggs from fewer hens. Not only that, but this production is being evened out over the year so that, before long, the time-honored flush and slack seasons for fresh eggs may be a thing of the past.

A few figures indicate this trend. They are very revealing. At the beginning of this year our farms had 20 per cent fewer hens and pullets than at their high point in 1944 and the estimators say that the decline will not be broken until next year. Yet egg production keeps up remarkably well. At the beginning of three sample years —1928, 1942, and 1947—there were nearly the same number of hens and pullets; but in 1947 there were 14 per cent more eggs than in 1942 and 43 per cent more than in 1928.

Laying Speeded Up

An astonishing advance in the "rate of lay" is the immediate explanation. We are having an annual average of 127 eggs per bird, whereas in 1942 we had 114, and in the late 1920's only

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Are You Shortchanging Your Corn Crop?

By P. H. DeHart

Agricultural Extension Service, Virginia Polytechnic Institute, Blacksburg, Virginia

WITHIN the next few weeks the majority of the corn will be planted. Corn growers will determine the yield per acre and to a certain extent the returns for their labor, rent of land, and other investments necessary in corn production prior to or at time of planting. County agents, vocational agricultural instructors, and other agricultural workers will be asked by many farmers for information on corn production. No doubt, there will be thousands of meetings held throughout the country, at which time corn production will be discussed.

The results of many years of research work have definitely shown that the combination of thick planting, use of an adapted hybrid, adequate plant food, and other good cultural practices will, if given an opportunity to work together, result in higher corn yields and a lower cost per bushel. In addition to the research work, this has been demonstrated in a practical way by many farmers in most every county and neighborhood. The above is simply a statement of facts with which most of us will agree. Now, if you are a fertilizer dealer, county agent, or other agricultural worker, what will be your recommendations on corn production? Will you advise the use of a recommended hybrid and planting a little thicker than normal and then fail to include enough plant food to make a good yield and a profitable corn crop? If the joint recommendation of the Experiment Station and the Extension Service is 600-800 pounds of a complete fertilizer per acre, plus 30-80 pounds of nitrogen per acre or whatever amount recommended, do you compromise on less plant food?

When you know that the fertility level of the soil where the corn is to be grown is low, that is 20- to 30-bushel corn land, do you give minimum or maximum recommendations for plant food? Are you guilty or not guilty of giving recommendations that can result only in a starved crop, low yield, and high cost per bushel? I think we all should ask ourselves the question, "Am I guilty or not guilty of compromising with the plant-food needs of the crops?" The plant-food requirements of a corn crop were determined by nature and I do not think we can change this.

When you recommend less plant food than is required to produce a 100-bushel corn crop, a limitation is placed on the farmer's income or salary. When a farmer fails to follow your recommendation, the farmer is limiting his own income, which he has the right to do. However, I do not think agricultural workers should limit a farmer's production per acre and his income by the indirect method of limiting the plant food recommended to produce the crop.

The change-over during the past 20 years from a plant-food recommendation of 200 pounds of superphosphate in a 3-year rotation to 1,500 pounds of a complete fertilizer, high in potash or its equivalent in manure or crop residue plus additional nitrogen to meet the crop needs, has been a drastic change when considered alone. However, when other changes that have taken place, such as hybrid corn, use

of mechanized equipment, hay driers, methods of marketing, new higher-yielding varieties of most crop and pasture plants, and many other similar changes are considered, the change in plant-food recommendations does not appear to be so drastic. Are you guilty or not guilty of holding on to the "mule and plow" age when plant-food recommendations are made?

It requires about 140 pounds of nitrogen, 56 pounds of phosphoric acid, and 130 pounds of potash to make 100 bushels of corn. This amount of plant food must be present and available to make 100 bushels of corn per acre. The recommendation should be to provide the quantity of plant food needed for high yields, either in the form of manure, crop residue, basic fertility of the soil, or commercial fertilizer. There should never be a compromise in the amount of plant food recommended. The method of providing the quantity of plant food needed will vary and will depend upon each individual situation.

Very often, agricultural workers will say that they do not recommend the amount of plant food a farmer needs because he will not use that quantity or he cannot afford to buy the amount recommended. The answer to the first reason is the farmer's own choice. If he chooses to spend his labor over a larger acreage to get the same returns, that is his privilege, but that should not change the recommendation. The answer to the second reason is that he may think he cannot afford to use adequate plant food, but really, he cannot afford to leave it off. It should be remembered that there is always a certain fixed cost to meet regardless of the yield.

If the plant food is restricted too much, the per-acre yield will never be high enough to "pay out" and have very much left. For example, a 20-bu. per-acre corn crop will not pay the fixed costs; whereas, the use of a good hybrid, thick planting, and $25 to $30 worth of plant food on soil with this fertility level should result in a yield of 80 to 100 bushels per acre if the soil type is suitable for corn and adequate moisture is available. With present corn prices and a yield of only 80 bushels, the use of this quantity of plant food would be a profitable investment. In addition, the fertility level of the land will be raised and the yields of all crops grown in the rotation will be higher. In fact, the increased yield of small grain and hay will usually pay for the increased plant food used on the corn crop. A production loan that does not provide for adequate plant food will keep both lender and borrower behind the 8-ball.

Guilty or not guilty—what is the verdict? This same principle on plant food is equally applicable to pastures and most other crops requiring fertilization.

Suggestions for Producing 100 Bushels of Corn Per Acre in Virginia

1. Have soil tested to determine lime needs, prepare a good seedbed, and use adapted hybrid seed.

2. Apply plant food to meet the needs for 100 bushels of corn. The following suggestions are for soil fertile enough to make 20 to 30 bushels per acre with very little, if any fertilizer. For soils of lower fertility, additional plant food must be added; and for soils of higher fertility, the suggested amount of fertilizer may be reduced.

Where Manure Is Used: Broadcast 10 to 15 tons of good quality, unleached stable manure reinforced with the equivalent of 500 lbs. of 20% superphosphate per acre and disc or plow it in before planting. Apply 200 to 300 lbs. of a complete fertilizer per acre in the rows at planting. Watch the growth of the corn, and if it begins to turn yellow at any time before last cultivation, apply 100 to 200 lbs. of nitrate of soda or its equivalent between the rows and cultivate in.

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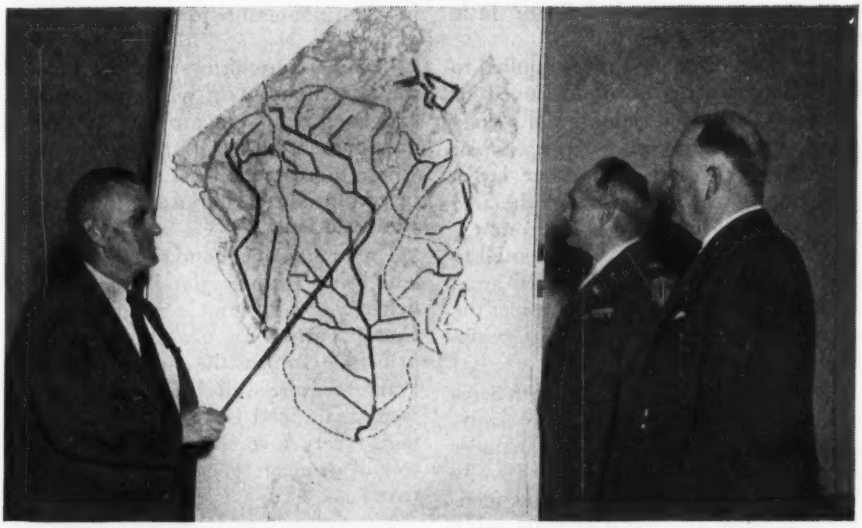

Fig. 1. E. A. Schlaudt, Regional Drainage Engineer, Soil Conservation Service, discusses drainage possibilities of 246,000-acre area in the Jasper Soil Conservation District with Col. E. G. Daly, Corps of Engineers, Charleston, and Dr. R. F. Poole, President of Clemson College.

Undeveloped Soil Resources of the Southeastern Atlantic Coastal Plain

By T. S. Buie

Regional Conservator, Soil Conservation Service, Spartanburg, South Carolina

THE people of America, along with those of other countries, are becoming concerned about the world's diminishing soil resources. As we look to the future in this country, with no new geographical frontiers to the west as there were in the past, we are beginning to realize that the land already settled must be used more effectively.

Farmers in soil conservation districts throughout the country are finding that they can increase production—as much as 30 per cent on the average—by using all their land in accordance with its capabilities and treating it in accordance with its needs. In carrying out complete farm soil conservation programs, they are bringing into production much

land that was formerly idle or little used.

The same principle can be applied to much larger areas of undeveloped or partially developed land. This may mean the planning and application of drainage, irrigation, and other large-scale improvement projects for the area as a whole. But the needs of our expanding population make it essential to take stock of all such substantial areas throughout the country and consider the economic feasibility of their development.

One such area of several million acres lies along the southeastern Atlantic coast. For nearly 300 years, pioneer settlers and their descendants literally walked over this strip of coastal territory, "passing up" much of it for what they considered to be better land to the west.

There are various reasons why this land along the Atlantic seaboard was not more fully developed. For one thing, it was an unhealthy section. Malaria took its annual toll and plantation owners had their summer homes in the "high hills of the Santee" or in the mountains to avoid malaria's scourge.

Fig. 2. Soil surveys are made to determine the capabilities of the land before drainage is undertaken. This area is on the C. C. Geraty farm, Johns Island, South Carolina.

Colonial agriculture developed along the immediate coast, where first indigo and later rice were grown. With the development of larger areas to the west where more economical methods could be employed, rice culture in this section was abandoned.

Under existing conditions, even the land lying further inland than the rice fields was not suitable for row crops. Cotton, corn, tobacco, and peanuts—the principal crops of the Southern Coastal Plain—require well-drained soil. Some farmers drained isolated tracts and obtained very favorable results. But the cost of drainage generally was prohibitive.

For many years, much of this land has been used intensively for truck crops. But when the entire coastal section is considered, these truck farms represent a relatively small part. They are readily accessible and it has been possible to develop drainage outlets economically.

The expansion of livestock throughout the South in recent years has given great impetus to the more complete development of this seaboard section. Until comparatively recent years, it was thought that the better breeds of cattle would not do well in the deep South, but now this is not necessarily the case. First-quality beef cattle, dairy cattle, hogs, and other livestock can be produced if there is sufficient feed of a nutritious kind for them.

Newly introduced grasses and legumes, properly fertilized and managed, have revolutionized the production of livestock in this region, where year-round grazing is the rule. Even in old rice fields and other areas where complete drainage necessary for row crops is too expensive, partial drainage may suffice for pasture.

Another important factor in making possible the more effective utilization of land in this section has been the development and use of heavy equip-

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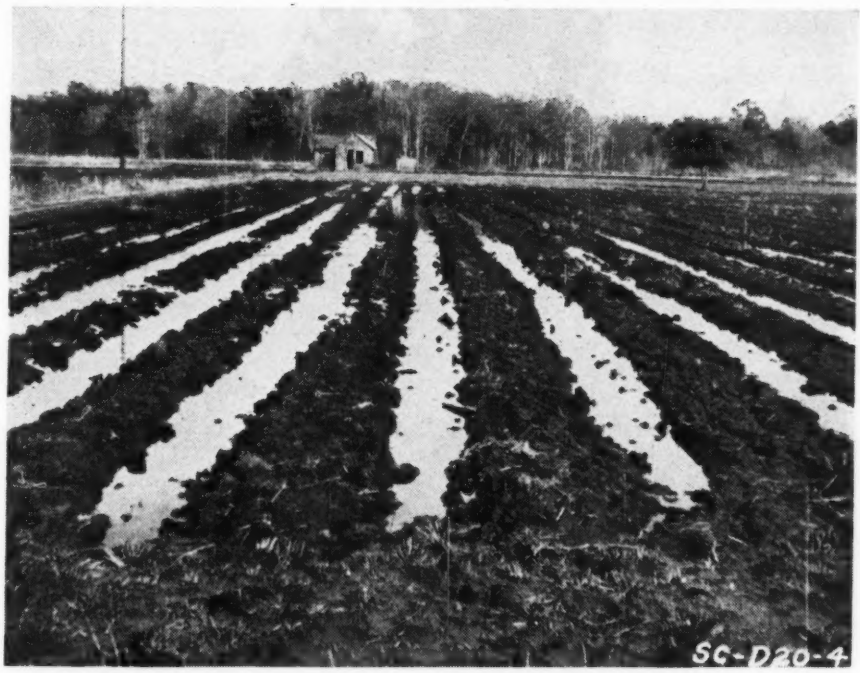
Above: **Dragline excavating a main canal on the Cypress Woods plantation in Jasper County.**

Below: **Clearing thin stand of pines and other growth on the T. W. Thornhill farm in Charleston County before construction of drainage system.**

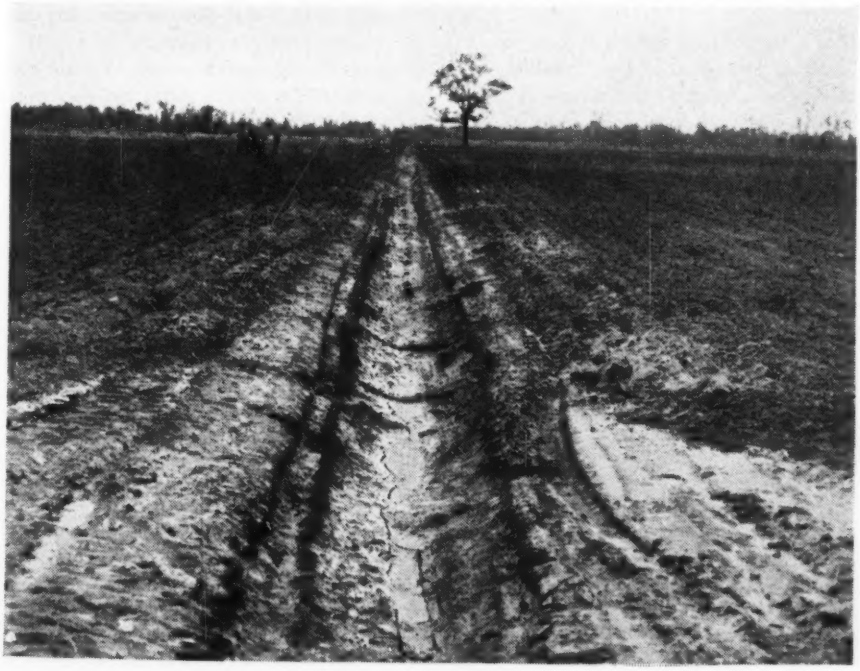
Above: This main canal on Cypress Woods plantation takes water from 2,000 acres of fertile land not previously cultivated.

Below: Part of a 35-bale cotton crop was lost here because of poor drainage. SCS technician planning the drainage system is appropriately clad in hip boots.



Above: **This land prepared for cultivation in Berkeley County shows the need for irrigation.**

Below: **A V-type farm drainage ditch on the Cypress Woods plantation in Jasper County.**



Above: **This 2-year-old bicolor lespedeza strip in an idle field on the C. P. Key farm near Lodge provides ideal food for quail and other small game.**

Below: **Harvesting beets on the C. C. Geraty farm, Johns Island. The fields are drained by open ditches, and supplemental irrigation is provided during dry periods by pumping water from wells through portable sprinkler systems.**

The Editors Talk

Reclamation Eastern Version

When we hear the word "Reclamation" we usually think of the West. To most of us the word suggests desert areas with many miles of irrigation canals carrying water to parched land from reservoirs backed up behind huge dams, all constructed with the expenditure of tens, maybe hundreds, of millions of dollars. We think of isolated areas, largely uninhabited where all the facilities of living—transportation, highways, public utilities, schools, churches—are lacking and have to be provided if those who take up the newly irrigated lands are to get anything more out of life than just growing their crops. These added costs, of course, are not included with that of the original installation. Yet, we can easily visualize the enthusiasm with which such areas are occupied by the thousands whose aspiration it is to own a farm of their own, undaunted by the labor and privations which they must endure before they can enjoy the full benefits of their pioneering. There is something in the word—Reclamation—that seems typical of America and its great works to make this country a better place in which to live and work and enjoy the products of our labor.

It is a bit startling, therefore, to be told that for such national projects one does not have to go west, nor consider desert areas, isolated and lacking the facilities to which we have grown accustomed and come to regard as essential, nor build great dams, nor spend great sums of money. Canals, yes—but in the reverse, so to speak, to drain instead of to irrigate.

Such a reclamation project is illustrated in convincing detail in the report issued by the U. S. Department of Agriculture, Soil Conservation Service, under the title, "Preliminary Report of Land Conditions and the Possibilities of Development Through Drainage, Flood Control, and Land Use Adjustments, in a Portion of Jasper Soil Conservation District, South Carolina." Here is a document that should be read by all of those who get a thrill from the thought of converting waste into profit, of utilizing our land and water resources for the maximum benefit to the maximum number of our fellow citizens—and who doesn't get such a thrill!

This report is a detailed study of 246,000 acres typical of an area of 5.25 million acres stretching along the coastal plains of North Carolina, South Carolina, and Georgia, which to be appreciated as to its extent and obvious project of reclamation should be viewed from the air. In flying over it, one naturally thinks of the lands reclaimed by the Dutch from the sea at the expenditure of so much money and labor and is bound to conclude that here is a vastly simpler problem with vastly greater rewards. The area here subject to reclamation and thus brought into more intensive agricultural production is equal to approximately the total cropland in the State of South Carolina in 1945. In other words, here potentially is the addition of the equivalent of another agricultural state—in terms of humanity, the equivalent of 21,000 farm families each with a 250-acre farm!

From the engineering viewpoint all that is required is drainage ditches to lower the water table to the desired and controlled levels and the construction of low dykes to prevent the flooding of the lower areas, a simple job with our modern machines.

Here are soils eroded from the upland areas during past centuries and deposited as the streams approached sea level, the topsoils whose erosion we have lamented but which now await our utilization whenever we get around to it. In the report cited, these soils have been surveyed and classified as to their varied adaptabilities, showing the diversified agriculture which they can support.

The report includes estimates of costs and profits which are highly illuminating particularly in contrast with comparable costs in desert areas. For example, costs including construction, land clearing, pasture development, contingencies, and technical assistance amounting in one area to $6.5 million would yield an annual *increase* in gross income of $1.27 million; in another a cost of $9.5 million would yield an annual increase of $3.57 million; and in a third, $3.6 million to yield $1.4 million per annum.

But of particular importance is the fact that once these reclamation projects are accomplished, practically all the other collateral facilities for the enjoyment of farm life to the full are already close at hand—transportation, markets, public utilities, and schools.

In addition there is an ideal climate with no extremes of temperature, short winters, and long growing seasons with abundant rainfall equably distributed, facilitating the growing of a wide diversity of vegetables, berries, and fruits for market or for the home table. And for the enjoyment of leisure there are close-by bays and rivers providing fishing and boating, and on land there is abundant game that make the region a sportsman's paradise.

The article by Dr. T. S. Buie and its many fine illustrations to be found in this issue further describe this region. Here is a reclamation project too long overlooked. What better return is to be found anywhere for our reclamation dollar?

Fertilizer Records

For the tenth successive year fertilizer consumption in the United States is setting a new season record. U. S. Department of Agriculture reports indicate that the supply that will become available up to June 30 this year will permit farmers to use about 7% more nitrogen, 5% more phosphoric acid, and 10% more potash than in the year ending June 30, 1948. This year for the first time plant-food supply of the three principal elements is expected to top 4 million tons. This is 2¾ times as much as for the average of the prewar years, 1935-39. During the war there was an annual increase in production of each of these three principal plant foods—nitrogen, phosphoric acid, and potash—with the exception of 1942 when nitrogen for fertilizer was less than in 1941. Its use in agriculture had to be limited in favor of its use in ammunition.

The Production and Marketing Administration notes that for the 1948-49 fertilizer year, as last year, farmers are likely to find it easier to buy mixed fertilizers than the straight run materials. For this year there will be an increase of an eighth—from 37,000 to 45,000 tons—in the nitrogen content of ammonia manufactured for direct application as a fertilizer. The report on the fertilizer situation says that the Department continues to urge that aggressive steps be taken to provide farmers with fertilizers having increased average plant-food content. The object of this is to reduce transportation and handling costs.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.6	64.2	88.4	11.87	22.55	....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941.....	17.0	26.4	80.7	94.0	75.1	94.4	9.67	47.65	....
1942.....	19.0	36.9	117.0	119.0	91.7	110.0	10.80	45.61	....
1943.....	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	42.0	149.0	192.0	109.0	141.0	16.40	52.70	....
1945.....	22.5	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946.....	32.6	38.2	122.0	218.0	156.0	191.0	16.70	71.90	....
1947.....	31.3	38.0	156.0	215.0	235.0	241.0	17.30	85.40	....
1948									
March.....	31.77	29.6	196.0	237.0	211.0	221.0	19.70	87.90	....
April.....	34.10	31.2	209.0	240.0	219.0	229.0	19.40	89.40	....
May.....	35.27	40.1	196.0	244.0	216.0	222.0	18.30	90.70	....
June.....	35.22	41.7	187.0	246.0	216.0	211.0	17.90	92.20	....
July.....	32.99	43.6	166.0	262.0	202.0	203.0	18.20	96.00	....
August.....	30.41	47.4	158.0	265.0	191.0	196.0	17.80	76.60	....
September...	30.94	46.7	153.0	232.0	178.0	197.0	18.00	68.10	....
October.....	31.07	50.6	142.0	207.0	138.0	198.0	18.40	63.70	....
November....	30.52	42.8	144.0	198.0	121.0	204.0	18.40	69.00	....
December....	29.63	45.7	154.0	219.0	123.0	205.0	19.10	68.80	....
1949									
January.....	29.27	42.9	166.0	236.0	125.0	202.0	19.80	65.70	....
February.....	29.14	29.5	172.0	244.0	112.0	194.0	20.50	53.40	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	93	81	109	74	87	110
1938.....	69	196	80	83	76	64	57	97	88
1939.....	73	154	100	85	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	107	117	107	81	211	129
1942.....	153	369	168	136	143	124	91	202	163
1943.....	160	405	188	232	174	154	125	231	245
1944.....	167	420	214	219	170	160	138	234	212
1945.....	181	366	205	232	198	170	127	227	224
1946.....	263	382	175	249	212	209	141	319	204
1947.....	252	380	224	245	366	273	146	379	249
1948									
March.....	256	296	281	270	329	250	166	390	295
April.....	275	312	300	273	341	259	163	396	340
May.....	284	401	281	278	336	251	154	402	262
June.....	284	417	268	280	336	239	151	409	213
July.....	266	436	238	298	315	230	153	428	213
August.....	245	474	227	302	298	222	150	340	172
September...	250	467	220	264	277	223	152	302	150
October.....	251	506	204	236	215	224	155	282	176
November....	246	428	207	226	188	231	155	306	186
December....	239	457	220	250	192	232	161	305	209
1949									
January.....	236	429	238	269	195	229	169	291	282
February.....	235	295	249	279	174	219	173	237	285

Wholesale Prices of Ammoniates

	Nitrate of soda bulk per unit N	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1924	2.99	2.44	5.87	5.02	3.60	4.25
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947	2.50	1.60	12.72	10.66	12.63	10.46
1948						
March	2.78	1.90	13.68	12.06	12.75	9.47
April	2.78	1.90	13.87	11.71	12.75	8.35
May	2.78	1.90	13.77	9.54	12.75	7.89
June	2.78	1.90	14.69	9.11	8.23	8.24
July	2.78	2.07	14.56	9.22	8.80	8.73
August	2.91	2.10	10.91	9.76	8.92	8.98
September	3.00	2.20	10.70	9.87	9.18	9.03
October	3.00	2.20	9.31	9.98	9.41	9.48
November	3.00	2.20	11.00	10.31	10.44	10.68
December	3.00	2.20	11.52	11.65	11.39	11.46
1949						
January	3.15	2.23	10.29	8.68	11.53	11.53
February	3.19	2.27	9.44	12.36	10.78	10.70
Index Numbers (1910-14 = 100)						
1924	111	86	168	142	107	121
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	12	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947	93	56	363	302	374	297
1948						
March	104	67	391	342	378	269
April	104	67	396	332	378	237
May	104	67	393	270	378	224
June	104	67	420	258	244	234
July	104	73	416	261	261	248
August	109	74	312	276	265	255
September	112	77	306	280	272	257
October	112	77	266	283	279	269
November	112	77	314	292	310	303
December	112	77	329	330	338	326
1949						
January	118	78	294	246	342	328
February	119	80	270	350	320	304

Wholesale Prices of Phosphates and Potash * *

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[1]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1924	.502	2.31	6.60	.582	.860	23.72	.472
1925	.600	2.44	6.16	.584	.860	23.72	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367 [1]
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947	.746	3.05	6.60	.498	.706	18.93	.195
1948							
March	.760	3.42	6.60	.375	.669	14.50	.200
April	.760	4.11	6.60	.375	.669	14.50	200
May	.760	4.61	6.60	.375	.669	14.50	.200
June	.760	4.61	6.60	.330	.634 [1]	12.76 [1]	.176
July	.770	4.61	6.60	.353	.676	13.63	.188
August	.770	4.61	6.60	.353	.678	13.63	.188
September	.770	4.61	6.60	.353	.678	13.63	.188
October	.763	4.61	6.60	.375	.720	14.50	.200
November	.770	4.61	6.60	.375	.720	14.50	.200
December	.770	4.61	6.60	.375	.720	14.50	.200
1949							
January	.770	4.61	6.60	.375	.720	14.50	.200
February	.770	4.61	6.60	.375	.720	14.50	.200
Index Numbers (1910-14 = 100)							
1924	94	64	135	82	90	98	72
1925	110	68	126	82	90	98	74
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947	139	84	135	70	74	78	83
1948							
March	142	95	135	68	70	60	83
April	142	114	135	68	70	60	83
May	142	128	135	68	70	60	83
June	142	128	135	62	67	53	80
July	144	128	135	65	71	56	82
August	144	128	135	65	71	56	82
September	144	128	135	65	71	56	82
October	142	128	135	68	76	60	83
November	144	128	135	68	76	60	83
December	144	128	135	68	76	60	83
1949							
January	144	128	135	68	76	60	83
February	144	128	135	68	76	60	83

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1924	143	152	143	103	97	125	94	79
1925	156	156	151	112	100	131	109	80
1926	146	155	146	119	94	135	112	86
1927	142	153	139	116	89	150	100	94
1928	151	155	141	121	87	177	108	97
1929	149	154	139	114	79	146	114	97
1930	128	146	126	105	72	131	101	99
1931	90	126	107	83	62	83	90	99
1932	68	108	95	71	46	48	85	99
1933	72	108	96	70	45	71	81	95
1934	90	122	109	72	47	90	91	72
1935	109	125	117	70	45	97	92	63
1936	114	124	118	73	47	107	89	69
1937	122	131	126	81	50	129	95	75
1938	97	123	115	78	52	101	92	77
1939	95	121	112	79	51	119	89	77
1940	100	122	115	80	52	114	96	77
1941	124	131	127	86	56	130	102	77
1942	159	152	144	93	57	161	112	77
1943	192	167	151	94	57	160	117	77
1944	195	176	152	96	57	174	120	76
1945	202	180	154	97	57	175	121	76
1946	233	202	177	107	62	240	125	75
1947	278	246	222	130	74	362	139	72
1948								
March	283	262	233	137	85	379	142	71
April	291	264	238	137	85	380	142	71
May	289	265	239	137	85	370	142	71
June	295	266	241	128	85	309	142	65
July	301	266	247	231	88	317	144	68
August	293	266	247	129	91	285	144	68
September	290	265	247	131	94	287	144	68
October	277	263	243	130	94	277	142	72
November	271	262	239	134	94	311	144	72
December	268	262	237	137	94	336	144	72
1949								
January	268	260	233	136	97	313	144	72
February	258	257	231	136	99	309	144	72

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] All potash salts now quoted F.O.B. mines only: manure salts since June 1941, other carriers since June 1947.

**** The weighted average of prices actually paid for potash is lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Maryland Fertilizer Facts for 1948," State of Md. Inspection and Regulatory Service, College Park, Md., Mar. 4, 1949.

"Plant Nutrient Deficiencies Diagnosed by Plant Symptoms, Tissue Tests, and Soil Tests," Agr. Exp. Sta., Section of Soil Science, Mich. State College, East Lansing, Mich., Spec. Bul. 353, Jan. 1949, R. L. Cook and C. E. Millar.

"1948 Fertilizer Analyses and Registrations," Div. of Feed and Fert. Control, State Dept. of Agr., St. Paul, Minn., H. A. Halvorson.

"Effect of Ammonium Nitrate on Corn Production in Oklahoma, 1948," Agr. Exp. Sta., Okla. A & M College, Stillwater, Okla., Mimeo Cir. M-178, Jan. 1949, H. J. Harper and O. H. Brensing.

"Report of Inspection Work—Commercial Fertilizers and Limes," State Dept. of Agr., Charleston, W. Va., Bul. (n.s.) 58, June 30, 1947.

Soils

"Summary of Contour Farming Study, Urbana, Illinois," Agr. Exp. Sta. and Soil Conservation Service, Agronomy South Farm, Urbana, Ill., May 1948, C. A. Van Doren, E. H. Kidder, and R. S. Stauffer.

"A Key to the Soils of Ohio," Agr. Exp. Sta., Wooster, Ohio, Spec. Cir. 78, 1948, G. W. Conrey, A. H. Paschall, and E. M. Burrage.

"A Legume for Acid Soils, Lotus Uliginosus (L. major)," Astoria Agr. Exp. Sta., Oreg. State College, Corvallis, Oreg., Sta. Bul. 456, July 1948, H. B. Howell.

"Identification and Productivity of Western Oregon Soil Types," Agr. Exp. Sta., Oreg. State College, Corvallis, Oreg., Sta. Cir. 175, July 1948, W. L. Powers, E. F. Torgerson, and E. V. Dannen.

"Drainage Districts in Utah—Their Actvities and Needs," Agr. Exp. Sta., Logan, Utah, Bul. 333, Jan. 1949, J. H. Maughan, O. W. Israelsen, and E. G. Hanson.

"Reclamation of Saline-Alkali Soils by Leaching, Delta Area, Utah," Agr. Exp. Sta., Logan, Utah, Bul. 335, Dec. 1948, R. C. Reeve, L. E. Allison, and D. F. Peterson, Jr.

"Preliminary Report of Land Conditions and the Possibilities of Development through Drainage, Flood Control and Land Use Adjustments in a Portion of Jasper Soil Conservation District, South Carolina," Soil Conservation Service, U.S.D.A., Washington, D. C., Oct. 1948.

"Report of the Chief of the Soil Conservation Service, 1948," U.S.D.A., Washington, D. C., Oct. 11, 1948, H. H. Bennett.

Crops

"Rose Culture in California," Agr. Ext. Serv., Univ. of Calif., Berkeley, Calif., Cir. 148, Nov. 1948, H. M. Butterfield.

"Progress Report, 1937-1947—District Experiment Substation, Fort William, and Illustration Stations at Dryden and Emo, Ontario," Can. Dept. of Agr., Exp. Farms Serv., Ottawa, Can.

"Agricultural Research—Preserves, Food & Feed," Agr. Exp. Sta., Colo. A & M College, Fort Collins, Colo., 61st A.R., July 1, 1948.

"Propagation of Ornamental Plants," Agr. Ext. Serv., Gainesville, Fla., Bul. 137, Aug. 1948, J. V. Watkins.

"Sixtieth Annual Report, 1947-48," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga.

"Performance Tests of Corn Hybrids and Varieties, 1943-1948," Ga. Exp. Sta. and Ga. Mountain Exp. Sta., Univ. System of Ga., Experiment, Ga., Cir. 158, Jan. 1949, G. A. Lebedeff and O. L. Brooks.

"Planting Black Locust Trees for Fence Posts," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., Press Bul. 606, Feb. 10, 1949, R. D. Dixon and M. M. Murphy.

"Pruning Muscadine Grape Vines," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., Press Bul. 607, Revised Feb. 8, 1949, M. M. Murphy.

"A. E. S. in Hawaii—Twenty Years of Rural Service," 1946-48 Rept. of the Agr. Ext. Serv., Univ. of Hawaii, Honolulu, Hawaii, Bul. 49, Jan. 1949.

"Illinois Experimental Hybrid Corn Tests—1946," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AG 1331, Apr. 1947, R. W. Jugenheimer, E. R. Leng, and C. M. Woodworth.

"Performance of Inbred Lines and Single Crosses of Corn—1946," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AG 1334, Apr. 1947, R. W.

Jugenheimer, E. R. Leng, and C. M. Woodworth.

"Investigations on Agronomy Pasture Plots," Ext. Serv. in Agr. and Home Econ., Univ. of Ill., Urbana, Ill., AG 1335, June 1947, R. F. Fuelleman, W. L. Burlison, and W. G. Kammlade.

"Guide of Agronomy Experiments on the South Farm, University of Illinois," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AG 1336, 1947.

"Illinois Experimental Hybrid Corn Tests—1947," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AG 1354, Jan. 1948, R. W. Jugenheimer, L. F. Bauman, E. R. Leng, and C. M. Woodworth.

"Investigations on Agronomy Pasture Plots," Ext. Serv. in Agr. and Home Econ., Univ. of Ill., Urbana, Ill., AG 1365, May 1948, R. F. Fuelleman, W. L. Burlison, and W. G. Kammlade.

"Indiana Summary 1947 Corn Demonstrations," Div. of Agron., West Lafayette, Ind., Mimeo AY 118.

"Certified Corn Hybrids for Indiana," Div. of Agron., West Lafayette, Ind., Agron. Mimeo AY 119, Feb. 1948, S. R. Miles.

"Breeding Behavior at Successive Generations following Hybridization in Soybeans," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Res. Bul. 358, Dec. 1948, R. R. Kalton.

"Progress in Farm Research—1947," Agr. Exp. Sta., Univ. of Md., College Park, Md., 60th A. R., 1946-1947.

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"Sixtieth Annual Report—1947," College of Agr. and Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y.

"Landscape Steep Slopes," Agr. Ext. Serv., Cornell Univ., Ithaca, N. Y., Ext. Bul. 749, Aug. 1948, D. J. Bushey.

"Research and Farming, 1947—Seventieth Annual Report," Agr. Exp. Sta., N. C. State College, Raleigh, N. C., Vol. VI, No. 3, April 1948.

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"Monroe—A Pre-Wheat Soybean Variety for Northern Ohio," Agr. Exp. Sta., Wooster, Ohio, Spec. Cir. 79, Feb. 1949, L. C. Saboe.

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"Cotton Production and Insect Control, South Carolina, 1949," Agr. Ext. Serv., Clemson College, Clemson, S. C., Cir. 324, Jan. 1949.

"Farming and Progress, 1947-1948," State Dept. of Agr., Nashville, Tenn., 37th A. R.

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"Biennial Report, 1946-1948," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 336, Jan. 1949.

"Research Powers the Farm," W. Va. Agr. Exp. Sta., Morgantown, W. Va., Bul. 334, Biennial Rpt., 1946-48.

"Agricultural Progress in West Virginia," Agr. Ext. Serv., W. Va. Univ., Morgantown, W. Va., Ann. Rpt. 1948.

"18th Biennial Report—July 1, 1946 to June 30, 1948," State Dept. of Agr., Charleston, W. Va.

"Results of Hybrid Corn Yield and Fertilizer Trials in West Virginia for 1948," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Mimeo. Cir. 60, Feb. 1949, J. L. Cartledge, E. H. Tyner, R. J. Friant, and B. M. Ritter.

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Economics

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Baton Rouge, La., Mimeo. Cir. 86, Sept. 1948, J. P. Gaines.

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"Costs and Returns from Peach Production, Selected Areas, Utah, 1947," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 334, Oct. 1948, E. M. Morrison.

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The Fruit of Science

"I FERTILIZED it all," says J. Herb Johnson, Ft. Branch, Gibson County, Indiana, area champion 1947 ten-acre wheat improvement contest. Mr. Johnson, veteran wheat grower of southwestern Indiana, followed "the book" as far as good farming practices are concerned, using a rotation of corn, soybeans, and wheat seeded to Ladino clover. Vigo, a soft red winter wheat, newly released from Purdue, was planted and yielded 46 bushels per acre.

"Vigo is the best wheat that I have ever sown," Mr. Johnson declares. "It stands well and is a good combining wheat. Vigo is resistant to loose smut and leaf rust, and I have discarded all other soft wheats in favor of Vigo."

In fertilizing his wheat, Champion Johnson used 400 lbs. of 3-12-12 per

Mr. Johnson sampling champion wheat.

acre in the fall of 1946 and top-dressed in the early spring of 1947 with 100 lbs. of ammonium nitrate per acre. The wheat was combined about the 10th of July, and the 46-bushel yield was verified by S. R. Miles, G. H. Enfield, and H. H. Kramer, all of Purdue University, who judged the 10-acre wheat improvement contest and awarded the championship. Twenty-four samples of wheat, cut 30 inches wide across a drill width, from the Johnson 15-acre field, were taken to Purdue, threshed, and the yields computed. Test weight on the Vigo was 59.6 lbs. per bushel.

Earl Heseman, President of Igleheart Brothers, Incorporated, awarded Mr. Johnson a $100 gold watch for his outstanding achievement in producing the highest yield in the "Pocket Area" since the beginning of the soft red winter wheat improvement program in 1930.

In crowning him area champion, Austin Tomey, President of the Southwestern Indiana Wheat Improvement Association, warned Mr. Johnson that hundreds of wheat producers would be seeking to take the championship away from him next year. "Maybe they'll do it," he replied, "but I'll sure give them a run for their money." Johnson won the 10-acre contest with Rudy wheat in 1942. There were 274 entries in the 1947 contest.

Mr. Johnson owns 300 acres and rents an additional 140 in Union Township, Gibson County. Graduating from high school and Lockyear's business college 41 years ago, he kept books for an agricultural concern for two years and then decided to engage in farming. He has farmed for 39 years continuously on the home farm near Ft. Branch and now uses hybrid corn, McCoupen soybeans, Vigo wheat (certified), sweet clover, alfalfa and Ladino clover in his rotation. For many years Mr. Johnson grew Rudy wheat but discarded it in favor of Vigo in 1947. All seed wheat is cleaned and treated every year on his farm.

Mr. Johnson is a director in the Gibson County Farm Bureau and an important cog in the wheels of Better Agriculture in his community and his county. He cooperates closely with his County Agent, Al Gessell of Princeton, Indiana.

. . . . H. R. LATHROPE, *Extension Agronomist, Purdue University.*

Development of American Potash Industry

(*From page* 14)

Among the most effective educational devices has been the widespread adoption of diagnostic techniques for determining the fertility status of soils and the nutritional status of the crops growing thereon. Principal among these are the soil tests provided largely by state laboratories to which farmers can send their soil samples for analysis. These reveal the presence, or more frequently the absence, of potash in adequate supply in forms available for crop nutrition, thus providing authentic information for the farmer's guidance.

Related thereto is our growing knowledge of what constitutes the balanced nutrition of the major crops. In applying this knowledge as a diagnostic technique, the crop is "sampled" by the collection of leaves or other parts which are analyzed for their plant-food content. This procedure is resulting, with respect to potash, in the establishment of the so-called "critical levels" of potash content characteristic of the respective crops below which potash deficiency is indicated as determined by crop yields.

Contributing also to this increase in

potash consumption has been the changing pattern of American agriculture. The great expansion of interest in soil conservation and in the adoption of the various practices that enter into that fundamentally important program have been conspicuous in this respect. Somewhat related thereto is the fertilized pasture, a revolutionary new development, particularly in the South where the potentialities of a livestock industry are being so widely demonstrated through actual practice. In addition, this program is being promoted there as an important phase of diversification to relieve dependence on cotton and the one-crop system which its growing so extensively represents. For the fertilized pasture, legume-grass mixtures are prescribed, with liberal applications of high-potash fertilizer grades. For grazing and hay the legumes are being increasingly grown with emphasis in the South on alfalfa where its successful growing has now been made possible with adequate high-potash fertilization, provided borax is included. High-potash mixtures are in great demand and when unobtainable create the impression of inadequate potash supplies.

Among the changing patterns mention should be made of the radical new practices in the growing of the corn crop, it now having been demonstrated that with greatly increased fertilization applied to the adaptable hybrids, closely planted, yields can be more than doubled over the averages obtained by the old practices.

In this new development increased applications of compounds of nitrogen are the major feature, although the balanced ratio of potash is likewise essential. With the prevailing high wages for farm labor, yields per acre take on added importance in determining farm profits, the adequate use of fertilizers to this end having been demonstrated as yielding a handsome profit on the money so invested.

Mention should be made likewise of the sensational new results in the development of chemical pesticides, enabling the farmer more effectively to resist the inroads of the multifarious organisms that infest his crops, reduce his yields, and thereby his profits. As a striking illustration of this changing pattern, mention need be made only of the phenomenal increase in cotton yields recently reported as resulting solely from the complete elimination of the boll-weevil. With the repetition and verification of these results, the conclusion is being drawn that once the boll-weevil hazard is eliminated, the cotton farmer can greatly increase his fertilizer applications on that crop with assurance of a profitable return on the investment.

All these and other phases of the changing pattern, while currently increasing his income, enhance the economic stability of the American farmer as a lasting result, rendering him less vulnerable to unfavorable changes in the economic pattern and by that route lending stability to the industries dependent upon him as the ultimate consumer of their products.

Witnessing the rapid strides being made in potash production, the question arose among conservationists as to the dimensions of the Nation's potash reserves and their life expectancy at the current rate of production—a pertinent question worthy of mature consideration. Estimates of reserves had been made earlier by competent Federal agencies, but were based on earlier surveys predating the later and more detailed surveys conducted by the potash industry itself whose data had not been made public. To make these data available for the information of the interested public, a survey of reserves was financed by the four major producers, it being conducted by the eminent consulting mining engineer and geologist, Samuel H. Dolbear, whose findings were presented in the report, "Potash Reserves of the United States," issued by the American Potash Institute in 1945.

Summarizing in part, this report states:

"Known resources of potash in brines and in highly soluble salts of deposits now under production amount to 107 million tons of actual potash (K_2O) of which 73 million tons are estimated to be recoverable.

"Possible reserves of sylvite yet undeveloped in the New Mexico field may add as much as 400 million tons to these reserves.

"Polyhalite, a mineral containing soluble potash, has been encountered in the Permian Basin over an area of 40,000 square miles. Beds explored by drilling and underground work in the Carlsbad area of New Mexico contain huge proved reserves. Proved reserves are estimated at 140 million tons of K_2O and there is in addition over 100 million tons of K_2O in probable reserves, with possible reserves several times these figures. The total gross potash (K_2O) content of proved and probable polyhalite is therefore over 240 million tons in and adjacent to the present potash operations in the Carlsbad area. The degree of probability in this case is of such character that the proved and probable figures have been combined in estimating reserves."

Expand As You Learn

(*From page* 21)

that when he added extra potash to his corn, for instance, the ears were heavy and well-filled instead of being nubby and shriveled.

H. Roy Rogers of the Bushy Fork section saw this result on the Moore farm and, when he learned what made the difference in yield, he tried out the same fertilizing plan with his corn. He owned one field on which he had applied liberal amounts of manure for years. He grew corn and red clover on that tract but he was never satisfied with the yields secured. He felt that with the clover stubble plowed under and the manure scattered over the field, each year, he should really make lots of corn. But he didn't. There was something lacking. So when he saw what Mr. Moore was doing, he added more potash in his fertilizer and his acre yields began to jump. In 1945, Mr. Rogers became the first man in Person County to produce 100 bushels of corn on an acre of ground.

J. T. Horton of the Bushy Fork section began to use a 3-8-5 fertilizer under his corn more than 15 years ago. At that time, this was considered a high analysis and a rather expensive fertilizer to use under corn. But Mr. Horton says it has always paid him well because the increased yields, on his kind of soil, more than paid for the high-analysis mixture applied.

Probably J. H. Shotwell of Roxboro, Route 2, proved the case of better fertilizer for corn in a more positive fashion than anyone else in the county. He had three acres on which he could not seem to get a good crop, no matter what he tried. Six years ago, he planted the three acres to corn, fertilized it in his usual way; but, on one acre, he applied an additional early topdressing of 100 pounds of muriate of potash. This one acre, so treated, produced 50 bushels of corn an acre. The production on the other two adjoining acres was so trashy and so sorry that Mr. Shotwell made no effort to harvest it. He has another six-acre field that has not been producing as it should; and now, since it has come time in the rotation to put this field back into corn, the owner will fertilize it with a 3-12-6 or a 3-12-10 mixture and then sidedress with muriate of potash. If he cannot

get the muriate, he plans to buy some kind of topdressing material rich in potash and use that.

The GI trainees around the Helena High School community made some excellent yields this past year. Fifteen of them produced an average of 113.7 bushels at a cost of only 16.4 cents a bushel for fertilizer. Most of this corn was grown on land where legumes had been turned under and which was well fertilized with phosphates and potash. The group is not satisfied with what it did in 1948 and will make an effort to get 50 men in the Helena community this year to attempt the production of at least 100 bushels an acre on the 50 farms. The veterans say they can have a part in meeting that corn-growing challenge sent to Governor W. Kerr Scott by Governor William Tuck of Virginia.

Undeveloped Soil Resources

(*From page* 26)

ment. For the first time since the days of slavery, when labor was available at very low cost, many landowners are finding it economically feasible to construct drainage ditches and outlets. Some of the drainage ditches being rehabilitated at the present time were originally built by slave labor and had fallen into disuse and disrepair during the decades. With improved drainage conditions, malaria is fast becoming a thing of the past and is no longer a menace to year-round residence.

Farmer-organized soil conservation districts in this coastal area have made available to landowners technical assistance in planning and laying out sound drainage programs and have provided the mechanism for large-scale drainage undertakings on a community basis. Opportunity for individual action on drainage problems was limited to small local areas. Facilities available through the districts make possible extensive surveys to determine the feasibility of drainage projects and the development and application of detailed plans for construction and maintenance of drainage systems of several thousand acres, representing a number of landowners.

Preliminary studies by the Soil Conservation Service over a period of years indicated that there was much productive land which could be drained or given more adequate drainage. In determining the location of such areas, two factors are given consideration. First, the economic feasibility from an engineering standpoint for constructing major outlets; and second, the capability of the land proposed to be drained. It is senseless, of course, to undertake a large drainage project and then discover that the capabilities of the land make it unproductive. Likewise, there is a limit to the amount of money which may be justifiably spent in draining land, regardless of how good it may be. Therefore the two considerations—engineering practicability and soil capability—go hand in hand.

In order to obtain more definite information, the Soil Conservation Service made a fairly complete study of a part of Jasper Soil Conservation District, embracing Jasper and a part of Beaufort County, South Carolina. This area is typical of the Lower Coastal Plain of the Carolinas and Georgia. The study showed that of these 246,000 acres, more than 160,000 not now cultivated could be used for row crops or first-class pasture if protected from floods, drained, cleared, seeded, fertilized, or otherwise developed as needed. This is nearly five times the amount of land in the area now being cultivated. The study indicated that some three dollars

would be returned for every dollar invested in the drainage system and in clearing and developing the drained land.

This study, made by the Soil Conservation Service as a technical assistance to the district, indicated that it would be entirely practical to undertake the development of a drainage program for the Lower Coastal Plain of the South Atlantic States. Already more than 275,000 acres have been drained in North Carolina, South Carolina, and Georgia and the work is advancing as fast as equipment and technical assistance are available. It is essential that this type of work be guided and directed so that there will be no disappointments as a result of unwise action.

What seems to be the logical course would be for the appropriate public agency to provide the major drainage outlets and for the individual landowners to develop the smaller laterals and farm drains. Thus the public at large as well as the individual farmers would make a contribution to this large-scale undertaking for increased agricultural production.

It is significant to note that Governor J. Strom Thurmond in a recent message to the South Carolina Legislature urged the complete revision of the State's drainage laws to permit the more adequate development of the South Carolina portion of this area. Similar interest along this line is being developed in other states.

Soil conservation district supervisors in the Lower Coastal Plain of South Carolina are taking the lead in seeking ways of developing these latent land resources. T. W. Thornhill of Charleston is chairman of an action committee, consisting of one member from each board of supervisors in the area. This committee is serving as a nucleus around which further activities are being organized.

The action committee came into being in March 1948 at a meeting in Charleston called by Dr. R. F. Poole, President of Clemson College, for landowners, soil conservation district supervisors, and business and industrial leaders. This large group studied the problem of the land and its use in the Lower Coastal Plain.

Dr. Poole expressed the sentiment of the group when he said, "There is a great opportunity here in South Carolina, not only to protect what we have left, but also to develop other resources."

Dr. H. P. Cooper, director of the South Carolina Experiment Station, commented that, "The individual has done practically everything he could . . . the job remaining is for civic or other large groups interested in the development of areas as a whole."

The information available from the Jasper survey indicates that three million acres of potential cropland are available in South Carolina, and comparable tracts in each of the adjoining states of North Carolina and Georgia. Probably all of this land will not be needed for the production of crops at an early date, but certainly much of it can be used to good advantage for the immediate production of increased numbers of livestock.

There are many related advantages that will enter into the profitable use of this land. One is the increased markets that will inevitably develop in the near future. Another is the proper processing of the food products raised. As industries develop, there will be greater and greater opportunity not only for the local processing of food products, but for their distribution and sale as well.

Two important factors will facilitate the effective development of the area. These are the use of larger equipment for drainage, clearing, and other types of land preparation, and the adequate fertilization of crops grown. Potentially, much of this land is highly productive, but a great deal of it is low in fertility and will require adequate applications of fertilizer if it is to produce to the fullest extent.

Drainage and clearing operations will

Fig. 3. Pick-up hay baler in operation on drained field on the Cypress Woods plantation in Jasper County, South Carolina.

reduce to some extent the present acreage devoted to forest. This could be compensated for, however, by the improvement in conditions for forest growth that would result from the partial drainage of other sites, where profitable woodland production is not now possible, and by taking the proper steps to reduce the fire hazard.

The wildlife population need not be adversely affected by these operations. Large areas will remain undrained because of the cost of drainage or because they are not suitable for intensive use. By recognizing the place of wildlife in the farm economy the numbers of quail and other small game could actually be materially increased.

As we consider the future needs for productive land, it might be well to focus our sight upon this strip of coastal territory that has lain so long only partially developed. With the principle of good land use as a guide, this vast area can be developed to its maximum capacity for production of crops, livestock, forests, and wildlife. The facilities are at hand to do the job.

Shortchanging Your Corn Crop?

(*From page* 24)

Legume Crop Turned: A 12- to 18-inch growth of crimson clover, vetch, or red clover turned under will usually supply the major part of the nitrogen needs. However, the other plant-food requirements must be met with commercial fertilizer. Broadcast 500 to 600 pounds of a complete fertilizer such as 3-12-6 or 2-12-12 (without borax) and disc in or drill it in the seedbed before planting. Then, use 200 to 300 pounds of the same analysis in the row at planting to give the corn a quick start. If a good growth of legume, that is 12- to 18-inch growth, is not turned, apply

25 to 60 pounds of nitrogen per acre.

No Legume and No Manure: Broadcast 500 to 600 pounds of a complete fertilizer such as 3-12-6 or 2-12-12 (without borax) and disc or plow it in or drill the fertilizer in the seedbed with grain drill before planting. Apply 200 to 300 pounds of same analysis fertilizer in the row at planting. Apply 100 to 125 pounds of nitrogen per acre in some form of nitrogen fertilizer, such as 700 to 800 pounds of 16% nitrogen material, 500 to 600 pounds of a 20% nitrogen material, or 300 to 400 pounds of a 33% nitrogen material, or the equivalent. On heavy limestone or similar soils, broadcast and disc the nitrogen fertilizer in the seedbed before planting or apply full amount as a sidedressing when the corn is 12 inches high. In Eastern Virginia or on other light, sandy soils, apply one-half of the nitrogen when the corn is knee-high and the balance at last cultivation.

3. Plant Thick. Plant the corn so as to have a final stand of 12,000 to 14,000 stalks per acre—3½-ft. rows with plants 10 to 12 inches apart in the row, or 3-ft. rows with plants 12 to 14 inches apart in the row.

4. Cultivate Shallow. Use spike-tooth harrow, peanut weeder, or rotary hoe on corn from the time it comes up until it is 2 to 3 inches tall. Then, two or three shallow and flat cultivations should be sufficient. Stop cultivation when the corn is 2½ to 3 feet tall.

Suggest to all your neighbors that they grow a small acreage on this plan. STATE GOAL—50 Bushels State Average Yield by 1950—LET'S ALL DO OUR PART!

Better Louisiana Corn

(*From page* 20)

hogged-off and this enterprise is increasing as rapidly as supplies of desirable type feeder pigs become available. Each 7 to 8 bushels of corn, where there is a good stand of interplanted soybeans, will produce an average of 100 pounds of pork. At present prices of corn and pork, hogging-off the corn and selling it as pork just about doubles the cash corn price.

Insects of Stored Corn

Corn in storage has as many or more insect enemies as does the growing crop. In fact, the losses to a corn crop after it is placed in the crib are very often greater than those sustained by the growing plants. Of these pests, the rice weevil is probably the most important. There is also the granary weevil which is almost identical in size, shape, etc. to the rice weevil; but it is less numerous and destructive, due largely to the fact that it cannot fly.

Other pests on stored corn include the angoumois grain moth, broad-nosed grain weevil, the Cadelle, saw-toothed grain beetle, flat grain bettle, rust-red flour beetle, and a number of other insects.

The same control measures recommended for the rice weevil will control all of these other pests, consequently the same measures are recommended which are given below for "Weevils."

Weevil Control in Storage

The corn should be harvested as soon as it is fully mature and dry enough to store without heating. Early harvesting prevents weevil breeding in the field.

Clean out corn cribs as soon as emptied of old corn or by the middle of

July. Sweep thoroughly and dust floors, walls, and ceilings with a 10% DDT dust or spray with a 5% DDT spray. DDT should not be placed directly on grain to be used as feed. If there is any carry-over of corn on the farm, it should be fumigated with carbon disulphide (carbon-oil) or with a commercial mixture containing three parts ethylenedichloride and one part carbon tetrachloride. Killing the weevils at this time prevents movement to the field and provides weevil-free cribs for storage.

Make the cribs as nearly airtight as possible by covering the floors and walls with one layer of heavy tar paper. Start at the bottom of the wall and work up. Overlap the strips about three inches. It is not necessary to seal over the top. Dust or spray the crib again after sealing.

When the corn has been stored in the crib and has had a few days to finish drying out, it should be fumigated with carbon disulphide at the rate of 1 to 1½ gallons for each 1,000 cubic feet of space. Best results are obtained when temperatures are at least 70°. After using the carbon disulphide, do not open the crib for at least 3 days. *Carbon disulphide is highly inflammable and therefore dangerous.* Take every precaution to keep matches, cigarettes, pipes, lanterns, cars, trucks, electric and gasoline motors away from the crib during fumigation.

A commercially prepared mixture of 3 parts ethylenedichloride and 1 part carbon tetrachloride, which does not have the fire hazards of carbon disulphide, can be used for fumigation. Use for this mixture at following rates:

100 bu. of corn—1 gallon
500 bu. of corn—4 gallons
1,000 bu. of corn—6 gallons

The two fumigants described above do not affect the feeding qualities of the corn. They may be used again in the spring if weevils are doing damage.

Louisiana, and all the other southern states, can produce 40 or more bushels of corn per acre by simply following research and extension recommendations. All doubts are behind us and the facts are before us. Corn in the South can, and eventually will, come into its own.

Egg Crop Has Surprises

(*From page* 22)

91, as an average. Ten years earlier the rate of lay usually showed few changes from one year to another. Signs point toward a continuation of this upward trend.

Reasons back of this big advance are akin to the reasons back of increased farm production *per*. Better breeding is evident, better management methods are in more general use, and better feeding has its influence. Then there is the decided shift from farm to commercial hatchings which means a more rapid dissemination of improved strains.

Reasons for the decline in poultry numbers are similar to the reasons for changes in livestock numbers. The declines are a part of the over-all adjustment that has been taking place between animals to be fed on the one hand and the small supplies and the higher prices of feed on the other hand. Last feeding year the supply of feed concentrates per grain-consuming animal unit was 11 per cent lower than it was in 1946-47. Of course the supply of feeds is increasing now.

Leveling the Seasons

Leveling-off production so that the lay comes more evenly throughout the year is a promising development to be

watched. Twenty years ago more than half of the eggs laid in a year on the farms in this country were laid within four months—March through June. Today the figure is down to 46 per cent and further progress in this direction seems assured.

Many farmers are hatching chicks earlier than they used to and are feeding the laying flocks better, so they will get more eggs in the early winter when the prices for eggs are higher. They are managing to belie the complaint of the hired man who moaned that chickens were contrary things for "seems like hens just won't lay when eggs is high."

Regions Differ

Adjustments have taken on a pronounced regional aspect. In the North Atlantic region the number of layers has been increasing, whereas in the South Central, East North Central, and Western regions the number of layers has remained about the same. In contrast, in the West North Central region where the droughts of the 1930's were so severe, there are now fewer layers than in the 1920's although the number has fluctuated sharply with war and weather.

Changes among the regions in rate of lay are more pronounced. In 20 years the West North Central, the East North Central, and the North Atlantic regions have had increases of 40, 42, and 48 per cent respectively, while the other regions have had increases that average around 20 per cent. If all the regions increased the rate as the North Atlantic has, the result would be truly startling.

A Glimpse Ahead

Total supplies of all feed concentrates for the 1948-49 season will be considerably above those of 1947-48, according to the Agricultural Outlook Report. For the year as a whole therefrom, the relation between egg prices and feed prices will be more favorable to egg producers than they have been recently. Meanwhile, farm prices for eggs are likely to average almost as high in 1949 as in 1948, according to the Outlook, as consumer demand gives evidence of remaining strong.

Remarkable growth in the commercial broiler industry in the past decade or so and the tremendous improvement in the efficiency in unit output are beckoning topics when poultry and eggs are being considered but—that really is another story.

Pardon Me, Professor!

(*From page* 5)

for "blowing" could now be utilized.

Professor Maurice Morrison may have been a hard-drinking, caustic, and rebellious fellow in his time; but he certainly knew his instruments and eked out a slender income selling popular songs and sheet music in one corner of the stationery store. With his background as a former army band member and later boss of a small circus band, he brought something tough and fibrous to our town along with the strains of culture he wafted to the breeze.

The closest imitation we ever saw in our parts to the redoubtable Morrison was when the traveling pitchmen for the fake medicine vendors set up their platforms on the town square. Invariably they referred to each other as "the Professor," and if skill in psychology and oratory be the cue, then most of that peculiar gentry were fully entitled to bear it. Their skill

in persuasion and salesmenship was unmatched.

Word quickly swept through the wards that the medicine carnival had arrived, which brought young and old pell-mell to swell the crowd and swallow the buncombe. Two or three tents with a pine-board platform having uprights on which gasoline flares were lighted constituted the stage around which yokels and young'uns clustered.

The "wandering minstrels" played overtures and several lively intermissions, featuring a tramp comic and the traditional blackface banjo boy, with maybe an old-time fiddler or a mouth-organ virtuoso. When all the encores were exhausted, up came the Professor Himself, lugging a battered suitcase and chanting his superlingo out of the corner of a thin, weasel-shaped mouth. His stock of cleansers, menders, and cure-alls was only equalled by his fluency and nerve.

"Here, gent'mun and fair ladies, I wantcha to draw nigh to the rostrum so's I can demonstrate to you the greatest soap for absolute ablutions which civilized man has adapted from the secrets of the Aztecs of the Andes. After long and perilous journeys in the fastness of the jungle, a learned professor of our company has obtained for you this great boon to beauty and death to dirt. He calls it Alabus, after the pure white alabaster of ancient temples, and I will now lather this greasy shirt worn by our obliging banjo artist, and then apply a few drops of the wonder suds to his curly locks. After you see the wondrous transformation, our agents will pass out among you with a marvelous introductory offer of six bars of white and gleaming Alabus for only to-wenty-five cents, the price of five good see-gars."

WHEN the flares died down and the vocal flood had ebbed about three hours later, many of our trustful citizens had acquired fresh knowledge about "caveat emptor" and flasks of our own river water, well colored and flavored, a powerful glue that refused to flow from the can, and astringent soap that put blisters on your hands and holes in your socks.

Another kind of professor, for whose acquaintance I was beholden to my Mother, was the noted spiritualistic medium and mental necromancer, Professor Leland Cartright Haversham, who for a few days intrigued us with uncanny and creepy manifestations. He was imported to our town by a close neighbor of ours, Andrew Meaney, who was a devout believer in the cult.

OUR neighbor often played around with the astral bodies himself in a nonprofessional way. On one memorable occasion he caused a series of sharp raps on the tin pans in our "buttery" while we were sitting in the next room talking about cheerful incidents like haunted houses and messages from Beyond. Because of that weird event Mother had quite a time to get me in a receptive mood to go with her to the seance when Professor Haversham arrived.

Lest we succeed in raising too many ancient and long forgotten ghosts, I hereby renounce my original intention to carry you through the session with the spooks. It is sufficient to say that the noble professor went into a trance for once without the aid of his old friend, John Barleycorn, and got himself into the skin of a first-rate Injun chief. Amid considerable guttural abjurations and some war whoops, he convinced sundry dismal observers that all was very serene and saintly with their departed relations—indeed that they were far better off than the old towners themselves, what with the bad winter we were having and the high cost of living. (For months afterwards whenever anyone rapped at our front door I crawled under the table.)

Other similar kindred of the occult, who called themselves professors too, came to our town now and then. We enjoyed seeing and pondering upon

mesmerists, hypnotists, and clairvoyants, faith-healers and magicians. One such mystery man wore a turban and was called Professor Abdullah. He put a confederate sound asleep and left him prostrate on a none too clean cot in the show window of our weekly newspaper. He remained there for a week, and there were no signs that he ever arose on the sly to refresh himself or do anything else, although we hung around both late at night and bright and early. I recall likewise the ironic fact that one hypnotist of renown failed miserably in attempts to control the biggest fool we had in town, a nitwit whose mind was evidently too vacant for experimental research—like some of the weak plots we have in soil testing.

For several years Mother had among our keepsakes a small brown pamphlet with a diagram of a Greek head having various segments of the brain box partitioned off into areas alleged to be the seats of different directing forces of the mind. At the bottom it had the title, Phrenological Reading of — with my own name added in fancy flourishing script.

THIS was a memento of a visit to our house by Professor Horace Tomkins, a traveling head feeler, then following the current craze of phrenology. I was plenty scared, but as he did not try to pull my teeth or give me a shampoo, I submitted to his digital inspection for half an hour. He had lists of the attributes and mental peculiarities set down in the booklet, and with a pencil he checked the ones that dominated my ego. There were combativeness, acquisitiveness, secretiveness, aggressiveness, conjunctiveness, and a few more which I have forgotten.

Thinking that such a going-over by a brain specialist was a mark of real distinction, I bragged about what the professor did in my next recess at school. I recall how "Red" Smithers scoffed and said, "Just keep up that bunk much longer, kid, and I'll give you so many fresh bumps on your noodle that it will take six more darn professors to feel 'em over."

Some of the humbler and less pretentious characters in our community just came by the "professor" degree naturally. That is, they developed a keen practical skill and by degrees folks got into the habit of crediting them with attainments above the ordinary.

ONE such person was Professor Thompson, who owned a big livery stable and blacksmith shop combination. He also cared for a few race horses which made the pumpkin show circuit in the summer. I suppose he had acquired more actual knowledge of and ability in handling and judging horses than any other man I ever met—not excluding animal husbandry specialists.

Those were the heydays of the fancy teams and the slick turnouts, and "hoss-traders" often came along to catch the unwary and untaught. Whenever any prominent citizen decided to buy himself a new nag and a fine buggy, he usually consulted Thompson; and even the local veterinarian dropped in to swap technical dope with him and relied on the old liveryman when somebody's pet filly suffered from fistula, azoturia, or plain bellyache. Thompson could handle almost any rebellious colt or savage stallion; and in spite of the fact that he was the hero of a runaway hearse affair, he lived beyond his era and was finally laid to rest by a motorized mortuary.

Of less deserved renown and trust, but nonetheless a native wearer of the professorial title, was a gent among us who posed as a "water professor." By this he meant that he could guarantee to locate a well for you, even if you believed there was none in sight—up, down, or sideways. His water-witch tactics were erratic and uncertain. He tried to work a rain-making scheme out west later on, but the only thunder that occurred was that of the horsemen who chased him out of town.

Finally, we come to the victim of our

review, one who rightfully won the academic prefix and used it ably in the early days of agricultural education. In fact, they were a legion—not in the singular. Agricultural colleges in the early 1900's had not built up quite the complex and rigid system of official nomenclature and standing we boast of today. Teaching farmers "how to farm" by use of books and laboratories and chemicals and microscopes was just well-started on its career.

So in order to get proper recognition and support from the farmer legislatures, these state-operated colleges of agriculture scouted high and low for men who combined real practical experience with good personality and teaching sense. We had at least two such leaders who made big names for themselves—one in field crops and cereal breeding and another in sheep husbandry. Both were regular czars in their own realms, ran things with a high hand, and kept mighty close touch with the chairmen of the appropriation committees. Yet they were honest and refreshing souls, begetters of better things to come and without peer as public relations "experts." Note this, however, you never heard such newly made professors deny themselves the right to be called by that name. By using it early and often in addressing them, you never risked their anger.

BUT all this reminiscence makes me feel rather lonesome now because we possess so few professors. The best ones have graduated to the doctor level, the middle ones refuse to answer when you call them that, and the beginners often get sidetracked and plunge off base into some alluring commercial field before their "prof" title gets certified.

Yet, on the other hand, if I have unwittingly overlooked a few erudite ones among you by failing to respect formalities, I'm sure you'll be satisfied when I say, "Oh, pardon me, Professor."

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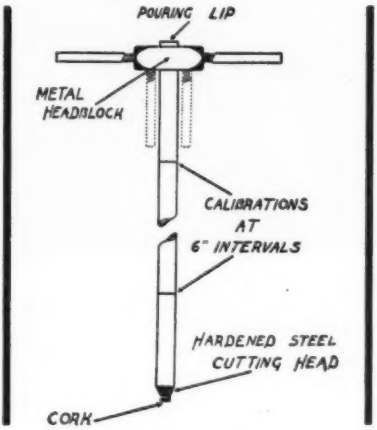

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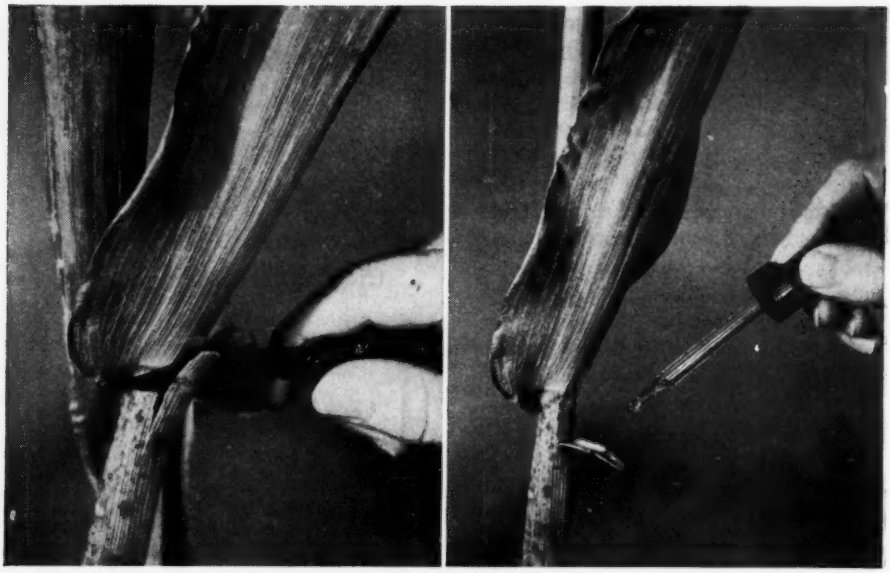
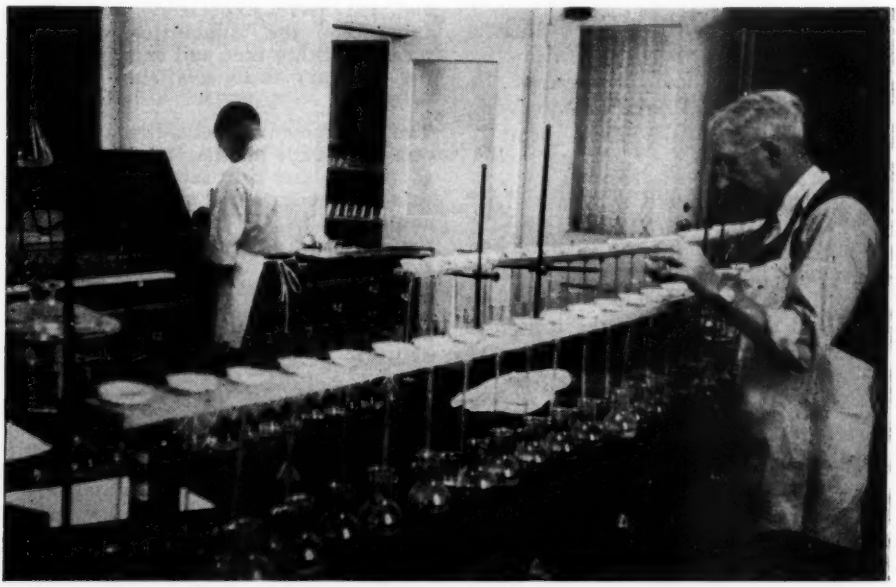


Nitrate tests can be made at the base of the leaf midrib without destroying the entire plant. This is an important consideration in making numerous tests on small experimental plots. The height of the plant at which nitrates are present as well as the intensity of the blue color gives an indication of the nitrate status of the plant.



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"I shall now illustrate what I have in mind," said the professor as he erased the blackboard.

★ ★ ★

An officer of ancient Rome, called away to the wars, locked his beautiful wife in armor, gave the key to his best friend, with the admonition, "If I don't return in six months, use this key. To you my dear friend I entrust it." He then galloped off to the wars. About 10 miles from home, he saw a cloud of dust approaching, and waited. His trusted friend, on horseback, galloped up and said, "You gave me the wrong key."

★ ★ ★

NEARLY THE TRUTH

"Do you say your prayers every night, Trudy?" asked the minister.

"Oh, no; Mummy says them for me," answered Trudy.

"Indeed; and what does she say?" he queried.

"Thank God you're in bed!" was the prompt reply.

★ ★ ★

Girl: "Why does it take a woman longer to dress than a man?"

Sailor: "Because a woman has to slow down for the curves."

★ ★ ★

While driving through a strange community the motorist observed the following traffic sign, "Go slow. Beware school children crossing here. Wait for the teacher."

A pretty airline hostess buzzed among the passengers as the plane taxied toward the runway. "Fasten your safety belts, please," she chirped.

The passengers snapped to, all except one portly old gentleman.

Thinking the man was deaf, she spoke directly to him: "Fasten your safety belt, please, sir."

"Why little lady!" he gasped, shocked. "Why (gulp) I don't have to, I wear suspenders."

★ ★ ★

In a school in one of the poorer districts of a big city, a questionnaire was sent home with a new pupil, requesting information regarding the home environment, number of brothers and sisters, father's occupation and so on.

The next day the child returned with a scrap of paper on which was the following:

"We have 18 children. My husband can also do plumbing and carpentry work."

★ ★ ★

"Rastus, what make dis bump on yo' haid?"

"I tell you Liza, I'se got dandruff an' dey tol' me to put toilet water on ma haid an' de fust t'ing you know dat ol' seat flap right down on me, yes, sah!"

★ ★ ★

Spinsters: "The girls who live and yearn."

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Outstanding results have been obtained with the application of Borax in specific quantities, or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work and recommendations of the State Agricultural Stations and County Agents are steadily increasing the recognition of the need for Boron in agriculture.

Boron is a plant food element and is commonly obtained from Borax since the element does not occur in the pure form. Fertilizer Borate is a semi-refined product containing 93% Borax.

Fertilizer Borate was placed on the market by the makers of "20 Mule Team Borax" as a fertilizer grade product to save cost of refining and hence to supply Borax at the lowest cost.

Fertilizer Borate is packed in 100 lb. sacks. Address your inquiries to the nearest office.

PACIFIC COAST BORAX CO.
NEW YORK • CHICAGO • LOS ANGELES

THE PLANT SPEAKS

A new four-reel series of 16 mm., sound, color films which may be booked independently or in any combination. They may be used to best advantage when shown at least one day apart and in the following sequence:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion, erosion, and deficiency symptoms on plants. (Running time 25 min. on 800-ft. reel.)

THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
Potash Production in America (All)
Save That Soil (All)

Borax From Desert to Farm (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

American Potash Institute
1155 Sixteenth Street
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